MAGAZINE

OF

ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*On the British Species of the Genus Cerastium, being an attempt to elucidate their distinctive characters.* By CHARLES C. BABINGTON, M. A. F. L. S. &c. (Plate VI.)

CERASTIUM, *Linn.*

Calyx of 5 sepals. Petals 5, bifid. Stamens 10–5–4. Styles 5–4. Capsule 1-celled, many-seeded, cylindrical, the apex opening by 10 or 8 erect teeth.

A. CERASTII VULGATI, *Fries.* The petals equalling or shorter than the calyx.

a. PERSISTENTES, *Fries.* The capsule curved, the petals about equal to the calyx, but sometimes slightly longer.

1. *Cerastium vulgatum*, Linn. Sm.—Leaves oval, petals about as long as the calyx, sepals lanceolate, acute, and together with the bracteæ, herbaceous and hairy throughout; capsule cylindrical, curved, about twice as long as the calyx, fruit-stalks about as long as the calyx.

C. vulgatum, *Linn. Sp. Pl.* 627. *Sm. Fl. Brit.* 496. *Eng. Bot.* 789. *D. Cand. Prod.* i. 415. *Reichenb. Icon. Plant.* f. 385, 386, 387. *Host. Fl.* i. *Aust.* 555. *Reichenb. Fl. excurs.* 4970. *Hooker, Br. Fl.* 215. *Lind. Syn.* 51. *Mack. Fl. Hibern.* 48.

C. viscosum, *Huds. Fl. Ang.* 200. *Curt. Fl. Lond.* ed. 1. *Wahl. Fl. Suec.* (excl. var.) 517. *Gaud. Fl. Helv.* iii. 240. *Fries Nov. Suec.* ed. 2, 128.

C. glomeratum, *Koch, Syn. Fl. Germ.* 121.

Root fibrous. Stems mostly erect, hoary with long spreading hairs, usually glandular. Leaves ovate, often very broad and usually obtuse, the lower ones narrowed into a petiole. Flowers aggregated or in dichotomous panicles, upon short stalks, which never exceed the calyx. Sepals lanceolate, acute, entire, the outer ones very slightly membranous, the inner rather more so, hairy throughout. Petals white, scarcely longer than the calyx. Capsule cylindrical, slightly curved upward, about twice the length of the calyx. Seeds very small, tuberculated.

In fields, on dry banks, &c. common. April—September.

2. *C. viscosum*, Linn. Sm.—Leaves oblong, lanceolate, petals about as long as the calyx, sepals oblong-ovate, and, together with the bracteæ, membranous at their margins and glabrous apices, capsule cylindrical, curved, about twice as long as the calyx, fruit-stalks longer than the calyx.

C. viscosum, *Linn. Sp. Pl.* 627. *Sm.* 497. *Eng Bot.* 790. *DC. prod.* i. 416. *Host.* 557. *Hook.* 215. *Lind.* 51. *Mack.* 48.

C. vulgatum, *Huds.* 200. (*Walcott Fl. Brit.* plate.) *Curt.* ed. 1. *Wahl.* 520. *Gaud.* iii. 238. *Fries*, 125.

C. triviale, *Link. en. hort. Berol.* i. 433. *Reich. Fl. excurs.* 4972, *Icon. pl.* f. 402, 403. *Koch, Syn.* 122.

β. *holosteoides*, Fries. "Glabrous, the stalks with their sides alternately pubescent."

C. holosteoides, *Fries.* nov. ed. 1, 32. *Link en. h. Berol.* i. 433. *Reich. Icon. pl.* f. 317, 318.

C. vulgatum, β holosteoides, *Fries. ed.* 2, 126.

C. triviale, β holosteoides, *Reich. fl. excur.* 4972. *Koch, Syn.* 122.

Root fibrous and stronger than in *C. vulgatum*. Stems diffuse, and, unless supported by other plants, prostrate, with their extremities ascending, of a much darker green than the preceding, and covered with shorter pubescence, usually without any glands. Leaves oblong or lanceolate, frequently acute, the lower ones narrowed into a petiole. Flowers collected in small terminal panicles, not forming dense fasciculated heads, as in *C. vulgatum*, upon stalks which are longer than the calyx. Sepals oblong-ovate, rather obtuse, entire, the apex and margins, particularly the inner one, broadly membranous, but slightly hairy and usually quite glabrous at their tips. Petals white, scarcely longer than the calyx. Capsule as in the preceding species. The seed, according to Gaudin, beautifully muricated, and of about half the size of that of *C. vulgatum*.

The whole plant is sometimes glandular, more particularly upon the peduncles and calyx, when it forms the variety *glandulosum* of

authors. There is also an alpine form "*var. δ. uliginosum*, Schleich." Reich. and *δ. alpinum* of Koch, which has broader leaves and larger flowers.

In fields on banks, walls, &c. common. May—September.

I have not noticed either the variety *holosteoides* or *alpinum* in this country.

From the very confused state of the synonyms in this first section, I cannot help thinking that it would be far better to adopt different names from those given by Linnæus, that is, *C. glomeratum* after Thuillier and Mertens and Koch, in place of *C. vulgatum* of Smith, and *C. triviale* after Link, Reichenbach and Mertens and Koch, in place of *C. viscosum* of Smith.

b. Fugaces, *Fries.* The capsule straight, the petals shorter than the calyx.

3. *C. semidecandrum*, Linn.—Leaves ovate or ovate-oblong, petals shorter than the calyx, sepals lanceolate, broadly membranous at their margins and apex, bracteæ with their upper half membranous, capsule cylindrical, slightly inflated, straight and longer than the calyx, fruit-stalk longer than the calyx, at first reflexed but ultimately erect.

C. semidecandrum, *Linn. Sp. Pl.* 627. *Sm. Eng. Bot.* 1630. *Hooker, Lind. De Cand.*, &c.

C. pellucidum, *Loisel. Fl. Gall.* i. 323.

α Friesianum, leaves ovate-oblong, stems filiform and erect. C. semidecandrum, *Fries*, 134.

β. glutinosum, very viscid, leaves ovate, stems thicker, more spreading and decumbent below. C. glutinosum, *Fries.* 132. C. viscosum, *Reichenb.* f. 399, 400, 401. C. pumilum, *Curt.*?

γ. macilentum, Fries. glabrous throughout. C. macilentum, *Reich.* f. 379, 380.

Root small, fibrous. Stems nearly erect, except in var *β.* usually covered with short glandular pubescence. Leaves ovate or oblong, the lower ones narrowed into a petiole. Flowers in small terminal panicles, often umbellated, upon stalks which are longer than the calyx, and are reflexed after the flower is faded, but ultimately again erect. Sepals lanceolate, somewhat acute, the apex and margins, particularly the inner one, broadly membranous, hairy but nearly glabrous towards their points, *(fig. d.)* Petals white, much shorter than the calyx. Capsule cylindrical, not curved, nearly twice as long as the calyx. Seeds minute tuberculated.

C. semidecandrum, *Lois.* is said, by him, not to have the mem-

branous margins to the bracteæ. He has, probably with justice, considered it as a distinct species, but has incorrectly retained the Linnæan name for it, rather than for that form to which it has been given by most, if not all other authors. Seringe has retained them both as distinct species in *DC. Prod.* but in the *Botan. Gall.* C. pellucidum is considered as a variety of C. semidecandrum. By Reichenbach (*Fl. excurs.* 4969,) C. semidecandrum, *Lois.* is referred to C. pumilum, *Curt.*, and considered as distinct from semidecandrum. I have unfortunately not seen authentic specimens of Curtis's plant, nor that of Loiseleur.

In dry fields and upon walls. April—May. I have not noticed var γ. in England.

4. *C. pedunculatum.* (Plate VI.)—Leaves ovate or oblong, petals much shorter than the calyx, sepals lanceolate, acute, covered with short glandular hairs, their apex and margins membranous, the margins of the bracteæ slightly membranous, capsule straight, subcylindrical, equal to or longer than the calyx, always erect, the fruit-bearing peduncles two or three times as long as the calyx, stems repeatedly dichotomous.

α. 5-*partitum.* Calyx and corolla 5-parted, capsule opening by 10 teeth, and longer than the calyx.

β. 4-*partitum.* Calyx and corolla 4-parted, capsule opening by 8 teeth, and about as long as the calyx. *Pl.*

The whole plant covered with short hairs, many of which are glandular. Root small, fibrous. Stems several, from 6 inches to 1 foot in height, erect, repeatedly dichotomous, bearing a flower in each fork, and having very long internodes. Leaves ovate or oblong, usually pointed, small, the lower ones narrowed into a broad petiole, the rest sessile. Flowers scattered, one in the axil of each fork of the stem. The peduncles of the fruit two, three, or even four times as long as the calyx, always erect and straight. Bracteæ slightly membranous at their margins. Sepals lanceolate, acute, covered with short glandular pubescence, membranous at the margins and apex. Petals much shorter than the calyx. The number of stamens is variable, as is usually the case in this genus. Capsule straight, cylindrical, as long or rather longer than the calyx, always erect, and never forming an angle with its peduncle. Seeds small and tuberculated.

On sandy ground. St Hellens, Isle of Wight. *Mr Borrer.* Southend, Essex. Annual. May and June.

I was for some time inclined to consider this plant as a variety of *C. brachypetalum,* Desp. but having recently received authentic specimens of that plant from Germany, (No. 389, in Reichenbach's

Flora German. exsiccata,) I am led to consider it as a distinct species. It differs from that plant, at the first glance, by its much more branching habit, and its want of the long shaggy pubescence with which that species is covered in all parts. *C. brachypetalum* also has its bracteæ totally destitute of a membranous margin, and the capsules nodding in a remarkable manner, the peduncle itself remaining straight and erect, but curved at a right angle, just below the calyx. This plant is well represented by Reichenbach in his *Plantæ Crit.* Fig. 388. Our plant may be distinguished from *C. semidecandrum* by its habit, its slightly membranous bracteæ, that plant having them membranous for half their length, and by its capsule being always erect, not at first pendulous, and then (when the seed is perfected) erect.

5. *C. tetrandrum,* Curt.—Leaves elliptical, petals rather shorter than the calyx, sepals lanceolate acute, their apex glabrous and attenuated with a central almost excurrent herbaceous line: the two margins broadly membranous, capsules straight, a little longer than the calyx.

C. tetrandum, *Curt.* Lond. *Sm. Fl. Brit.* 498. *Eng. Fl.* ii. 332. *Hooker,* 216. *Mack.* 48.

C. semidecandrum, *Bentham in Lindl. Syn.* 51.

Sagina cerastoides, *Sm. in Linn. Trans.* ii. 343. *Eng. Bot.* 166. *DC. Prod.* 1. 389. *Hooker,* 216.

Moenchia cerastoides, *G. Don. Syst. of Bot.* i. 420.

Esmarchia cerastoides, *Reich. fl. excurs.* 4954.

? Cerastium pumilum, *Koch, Sin.* 122‡ (not Curtis.)

Root slender. Stems procumbent, spreading, their extremities ascending, covered with short hair. Leaves elliptical, the lower ones elliptic-oblong, the lowest narrowing into a petiole. Flowers on stalks, which are rather longer than the calyx, but not invariably so, as large as those of *C. vulgatum.* Sepals 4, lanceolate, attenuated, acute, broad below, the apex glabrous with the mid-rib continuing to its extreme point in the form of an herbaceous line, bounded on both sides by a broad membranous margin. (Fig. *c.*) Petals 4, white, shorter than the calyx. "Capsule a little longer than the calyx, straight, with 8 long linear teeth. Seeds roughish on the outer edge."

There appears to be some confusion in Sir W. Hooker's Brit. Flora, which, I think, has not improbably arisen from his having received my *C. brachypetalum* β as *C. tetrandrum.* I have also recently received from Yarmouth, through the kindness of my friend Mr Ball of Christ's College, a tetrandrous form of *C. semidecandrum.*

In this plant the petals are about half the length of the calyx, and the stems are very short and spreading, but it agrees exactly with the specific characters of *C. semidecandrum*. On the same root of this Yarmouth plant I have noticed flowers with 4 and 5 sepals, and Mr Ball informs me, that although flowers with 4 sepals and 4 stamens were far the most common, yet that he noticed many cases of the presence of 5 sepals and 5 stamens, I am quite convinced that no confidence whatever can be placed upon the number of those parts in this genus. I have therefore omitted them altogether in my specific characters. Under these circumstances I shall only mention the station from which my specimens of this plant were obtained by the kindness of Mr R. B. Bowman of Newcastle, namely, Tynemouth, Northumberland. "May—June."

B. GRANDIFLORI, *Fries*. The petals twice as long as the calyx.

6. *C. alpinum*, Linn.—Hairy, the stems ascending, leaves ovate, ovate-oblong or lanceolate, flowers few, sepals bluntish, with their margins membranous, bracteæ wholly herbaceous, or with a narrow membranous margin, capsule at length twice as long as the calyx.

C. alpinum, *Bentham in Lind. Syn.* 51.

α. Linnæanum, smooth, or clothed with long silky hairs, stem mostly simple, flowers 1, 2, or 3, together in a forked panicle, bracteæ slightly membranous at the margin.

C. alpinum, *Linn.* 628. *Sm. Eng. Bot.* t. 472. *Sm. Eng. Fl.* ii. 333. *Hooker*, 217, *&c.*

C. latifolium, *Lightf. Fl. Scot.* 242. t. 10.

β. piloso-pubescens, Benth. Rough with short bristly hairs, stem branched, flowers usually solitary, bracteæ often wanting, but when present wanting the membranous margin.

C. latifolium, *Sm. Eng. Bot.* t. 473. *Sm. Eng. Fl.* ii. 334. *Hooker*, 217.

Root strong, creeping, stems mostly erect in var. *α*, prostrate in var. *β*, usually clothed vith spreading hairs. Leaves ovate, varying through all the intermediate forms to lanceolate, placed rather closely upon the stem in var. *β*, much more distantly in var. *α*. Flowers few in number, either solitary or in a dichotomous panicle, upon long stalks. Sepals ovate, with a membranous margin, bluntish, more so in var. *β* than *α*. Petals white, nearly three times as long as the calyx. Bracteæ lanceolate, acute, with a slight membranous margin, usually present in var. *α*, frequently wanting, and with the margin scarcely at all membranous in var. *β*. "Capsule oblong, cylindrical; when ripe about twice as long as the calyx." Benth.

I have been unable to detect any permanent character to distin-

guish *C. alpinum* and *latifolium* of Sir J. E. Smith, and have therefore followed Messrs Bentham and Lindley by considering them as constituting only one species. Their extreme forms certainly are very different, but intermediate states often occur, and it is then almost impossible to determine to which of the supposed species they ought to be referred. Mr Bentham is of opinion that the *C. latifolium* of our English authors is not the same as the Linnæan plant. I have therefore not quoted the Sp. Plant.

The peduncles of our plant are said by Koch to be deflexed after the flower has faded, and that is made a point of distinction between it and *C. arvense*, in which they are described as erect.

In the higher mountains of Scotland and Wales. June—August.

7. *C. arvense*, Linn.—Stems ascending, prostrate below, leaves linear-lanceolate bluntish, flowers in terminal panicles, sepals and bracteæ lanceolate, slightly acute and broadly membranous at their margins and apex, capsule at length longer than the calyx.

C. arvense, *Linn.* 628. *Sm. Eng. Bot.* 93. *Eng. Fl.* ii. 333. *Hooker*, 217. *Mack.* 49, &c.

C. arvense 1. commune. *Gaud. Fl. Helv.* iii. 244.

Root strong, creeping. Stems decumbent below, the flowering part ascending, covered with fine deflexed hairs. Leaves narrowly lanceolate, often nearly linear, their edges fringed below, placed closely upon the lower parts of the stem, but much more distant upon the upper part. Flowers much more numerous than in *C. alpinum*, usually about 7 in each di or trichotomous panicle, sometimes amounting to 14 or 15, upon long stalks, which, together with the general stalk of the panicle, are covered with minute spreading glandular hairs, (according to Gaudin the hairs upon the peduncles are sometimes not glandular, and then they are deflexed like those of the stem.) Sepals and bracteæ lanceolate, their margins and apex broadly membranous. Petals white, twice as long as the calyx. Capsule oblong, longer (shorter *Sm.*) than the calyx.

In gravelly and chalky places. April—August.

Note.—The *Cerastium aquaticum*, Smith, appears to be more naturally referred to the genus Stellaria, or, perhaps, in conformity with the views of Fries, to form a genus distinct from either of them. As, however, it is included in the genus Cerastium by Smith, Hooker, and Lindley, I have added its characters and synonyms, together with a few observations upon its nomenclature.

STELLARIA, *Linn.*

Calyx of 5 sepals. Petals 5, bifid. Stamens 10, rarely 5 or 8. Styles 3, rarely 5. Capsule 1-celled, many seeded, opening with 6, or rarely 5, valves.

A. Stellarium. Styles 3, the capsule bursting by 6 entire valves. This section includes the whole genus *Stellaria* of most authors.

B. Malachium. Styles 5, the capsule bursting with 5 valves, each of which is bifid at its extremity. *Larbrea*, Ser: in DC. Prod. (not of St Hil.) *Malachium*, Fries, Reichenb. Koch.

S. aquatica, Vill. Leaves cordate-ovate, mostly sessile and semi-amplexicaule, peduncles axillary and solitary, petals rather longer than the calyx, fruit-stalks reflexed.

Cerastium aquaticum, *Linn. Sp. Pl.* 629. *Eng. Bot.* 538. *DC. Prod.* iii. 366, (note,) &c.

Stellaria aquatica, "*Vill. Delph.* iii. 617." *Pers. Syn.* i. 500, (not of *Seringe in DC. Prod.* i. 398.)

Larbrea aquatica, *Ser. in DC. Prod.* i, 395, (not of St Hilaire.)

Malachium aquaticum, *Fries*, "*Hall.* 1817, p. 77." *Nov. Suec.* 121. *Reichen. Fl. excurs.* 4967. *Koch, Syn.* 120.

Stellaria pentagyna, *Gaud. Fl. Helv.* iii. 179.

For a detailed description of this plant I would refer to *Sm. Eng. Fl.* or *Gaud. Fl. Helv.*

The *Stellaria aquatica* of DC. Prod. i. 398, is *St. uliginosa* of Curtis and Smith, which is now distinguished as a genus under the name of *Larbrea* of St Hilaire. Seringe applied this latter name to our plant in De Candolle's Prodromus, as quoted above. This mistake was corrected in the third volume of that work, and the genus *Larbrea*, distinguished by its perigynous stamens, adopted for the *St. uliginosa* of Curtis. Our plant was, at the same time, referred back to *Cerastium*.

Should it be considered advisable to follow Fries, Reichenbach, and Koch, by separating this plant both from *Stellaria* and *Cerastium*, the name *Malachium* conferred upon it by Fries in the year 1817 cannot be retained. A genus of Coleopterous insects having been described under the name of *Malachius*, and therefore only differing in gender from *Malachium*, by Fabricius in his Systema Eleutheratorum, which was published in 1801.

According to Reichenbach and Koch, the *Cerastium manticum*, Linn. (*Stellaria mantica*, DC.) possesses the same structure as our plant. It is consequently referred by them to the genus *Malachium*, and will of course be included in our section of that name.

St John's College, Cambridge, April 8, 1837.

II.—*Characters and Descriptions of the Dipterous Insects indigenous to Britain.** By JAMES DUNCAN, M. W. S., &c. &c. (Continued from p. 459.)

FAMILY BOMBYLIDÆ, *Leach.*

ANTENNÆ consisting of three joints, the third not ringed and surmounted by an articulated style: proboscis long and porrected horizontally from the lower part of the face; palpi consisting of a single joint; head much narrower than the thorax; the latter very convex above; legs long and slender; wings divaricating, and usually having four posterior cells.

The insects included in this family belong principally to the southern parts of Europe and to Africa. Comparatively few, therefore, fall to be described by the British faunist, and these all admit of being referred to three genera, viz. Bombylius, Phthiria, and Ploas. These may readily be distinguished from each other by the relative length of the proboscis, and radical joints of the antennæ:

Proboscis longer than the head and thorax, { 1st joint of antennæ much longer than 2d, BOMBYLIUS.
{ 1st & 2d joints of antennæ short and equal, PHTHIRIA.
Proboscis shorter than the head and thorax, - - - PLOAS.

Genus BOMBYLIUS.

Antennæ inserted close together, the third joint turned outwards; the radical joint pretty long and cylindrical, clothed with very long hairs, second joint cup-shaped, likewise hairy, third long and subfusiform, nearly naked, attenuated, surmounted by a short oblique style, which consists of three joints, the central one longest, (Fig. 1:) labrum very long and spear-shaped, somewhat dilated a little before the point: tongue very long, and ta-

* As these descriptive notices are intended to embrace all the species recorded as British, it forms part of our plan to publish an appendix at intervals, supplying any accidental omission in the original papers, describing new species, and adding new localities, the latter of which have been furnished in great numbers through the attention of our correspondents. By following this method, we shall be enabled to present the subject in as ample, and, we hope, as complete a form, as its present progressive state admits of.

pering gradually from the base to the point, which is very acute; maxillæ setiform and shorter than the labrum; lip terminating in two curved lobes: head small and trigonate, hypostome densely hairy: eyes meeting in the male, but separated in the female; ocelli three, very minute (Fig. 4:) body short and bulky from being covered with fine down; wings narrow with two discoidal cells, the first posterior cell closed, legs very long and slender; basal joint of the tarsi as long as all the rest; pulvilli bilobed and very slender.

These insects are known at first sight by their downy bodies, long exserted proboscis, and the length and delicacy of their legs. From the first mentioned peculiarity, they bear so much resemblance to humble bees, that they are known in some parts of England by the name of humble-bee flies. Some of them are vernal insects, but others do not appear earlier than May, and one species, *B. minor*, is even later in taking wing, at least in Scotland. They fly only during fine weather, and in the middle of the day when the heat of the sun is greatest. They hover over flowers like the humming-bird hawk-moth, employing their long proboscis for a similar purpose, producing at the same time a humming noise—another point of resemblance to the insect just named. It is the latter circumstance to which the generic name refers. The following notice applies to *B. medius*, but it well describes the habits and appearance of the Bombylii generally. "Of all the active, vigilant creatures that animate our paths, we have none superior to the little bee-like bombylius; but this creature is to be seen only in the mornings of a few bright days in spring, seeming to delight in the hot windy gleams of that season, presenting an emblem of that portion of our year, fugitive and violent. It is, I believe, plentiful nowhere. Particularly solicitous of warmth, it seeks the dry, sunny reflection of some sheltered gravel-walk, or ditch bank in a warm lane; and here it darts and whisks about in seeming continual suspicion of danger; starting away with angry haste, yet returning immediately to the spot it had left, buffeting and contending with every winged fly that approaches, with a jealous pugnacious fury that keeps it in constant agitation. This action, its long projecting proboscis and its pretty spotted wings, placed at right angles with its body, distinguish our bombylius from every other creature. It appears singularly cautious of settling on the ground. After long hovering over and surveying some open spot, with due deliberation and the utmost gentleness it commits its long delicate feet to the earth; but on the approach of any winged insect, or on the least alarm, is away again to combat or escape. Associates it has none, the approach even of its own race excites its ire, and, darting at

them with the celerity of thought, it drives them from its haunts. When a captive, it becomes tame and subdued, and loses all its characteristic bustling and activity, the inspiration of freedom."*

Of the larvæ of Bombylius no account has yet been given. Fallen presumes that they live in the earth and feed on the roots of plants; a conjecture which appears probable, when we consider that those of the most nearly related groups afford instances of such an economy.

Bombylius major. (s.)

Linn. Donovan's Brit. Ins. ii. pl. 66.—*Meigen*, ii. 190; *Curtis*, B. E. pl. 613; ♂.—Bom. variegatus, *De Geer.* vi. 268, pl. 15. fig. 10.—Bom. sinuatus, *Mikan*, Mono. Bomb. Bohemiæ, pl. 2, fig. 4.—Bombylius, *Harris'* Expos. pl. 47. f. 2.

Ground colour of the body black, but the surface entirely covered with soft ochreous-yellow hairs; head with whitish-yellow hairs; antennæ dark-brown; hairs of the beard whitish; on the underside the hairs are yellowish-white, those covering the breast and the apex of the abdomen black. Wings with the anterior portion brown, that colour extending from the base, where it is widest, nearly to the apex, the internal edge forming a sinuated line; the remaining portion of the wing transparent; halteres dark brown; legs pale ferruginous, the tarsi brown. Length of the body 5½–6 lines; proboscis 3 lines. *(Wood-cut, fig. 3.)*

This insect, which is the largest of our British species, first appears in April and the beginning of May, and occurs occasionally in the more southern parts of England. It probably does not inhabit Scotland. "In plenty at Glanville's Wootton, New Forest, near Bristol, &c. in the months of April, May, June, and at times may be seen (as was the case in 1826 and 1827,) as early as March." *J. C. Dale, Esq.* "Open places in woods, Coomb, Norfolk, &c." *Curtis' Brit. Ent.* "Vicinity of London," *Stephens' Catal.* "I have seen this species twice at Raehills, Dumfries-shire." *Rev. W. Little.*

Bombylius medius.

Linn. Donov. Brit. Ins. v. pl. 146, f. 1; *Meigen*, ii. 196.—Bomb. major, *Samouelle's* Useful Comp. pl. 9. fig. 10.—*Wood's* Illust. ii. 106, pl. 71.—Bomb. discolor, *Mikan*, pl. 2. fig. 1.—Bomb. punctatus, *De Geer.* vi. pl. 15, fig. 12.—Bombylius, *Harris'* Expos. pl. 47, fig. 1.

Clothed with soft ochreous hairs, beneath which the surface is black. Head with brownish-yellow hairs, becoming nearly black towards the base of the antennæ; thorax with two lines of black hairs on each side, terminating anteriorly at the insertion of the wing; the female distinguished by a dorsal line of white down:

* Journal of a Naturalist.

abdomen having the anterior half clothed with fulvous hairs, the posterior half with black hairs, the female with a white anal spot; belly entirely covered with black hairs: base and outer border of the wings for nearly two-thirds of their length brown, the remainder transparent, with a brown spot at the base of each cell: halteres black: legs pale ferruginous, the tarsi dusky at the extremity. $5\frac{1}{2}$–$6\frac{1}{2}$, proboscis $4\frac{1}{2}$.

"Middle of April, open places in woods, Norfolk, Essex, and around London." *Curtis, Brit. Ent.* "In plenty at Enborne, Berks, several years ago, and in Tidworth woods, Hants, May 1829; rare at Glanville's Wootton." *J. C. Dale, Esq.* "Common on sunny banks in the spring; but the only species of this genus which I have as yet taken in Cambridgeshire." *Rev. Leonard Jenyns.* "Cambridge and Bath," *C. C. Babington, Esq.*

Bombylius pictus.

Meigen, ii. 198; *Mikan*, pl. 2, fig. 2.—*Panzer*, Faun. Germ.—Bomb. planicornis, *Fabr.*

Head with dark-brown hairs, the male with two white points over the base of the antennæ; the latter dark-brown, with the third joint flat and very much dilated, ending in a point, but without a distinct style. Thorax clothed with light-brown hairs, changing with the light into white, the back marked with five spots of black hairs, three anteriorly, and two behind; hairs investing the abdomen dark-brown, the sides with alternate fulvous and black tufts, and the hinder extremity with two white spots: belly black, halteres of the same colour; wings brown at the base and anterior margin to beyond the middle; the rest of the surface transparent and spotted nearly as in *B. medius*, but many of the spots usually larger; legs pale ferruginous. 5 lines.

This insect is admitted on the authority of Mr Stephens, who includes it in his catalogue among our indigenous species; but we have not ascertained in what part of the country examples occurred. It is no doubt a rare native: it seems doubtful whether it is found in France, and it is considered scarce in Germany, where it was first discovered.

Bombylius posticus.

Fabr. Meigen, ii. 200.—Bomb. micans, *Meig.* Klassif.

Body black, invested with fulvous hairs: forehead black in the male, inclining to brown in the female, having a white spot on each side in the former sex, and a single spot in the latter: proboscis, palpi and antennæ black, the latter with the third joint a little enlarged in the female: the fulvous hairs covering the body have a whitish schim-

mer when seen in certain directions, and those on the hinder part of the abdomen are entirely white: halteres brown; wings transparent, brown at the base, and having a small pale yellow spot towards the apex; the base slightly tinged with yellow only in the female. Halteres brown: legs shining yellowish-grey, the inner side of the anterior thighs, and all the tarsi black. $4\frac{1}{2}$ lines; proboscis 3 lines.

We have to adduce the same authority for regarding this as an indigenous species that was referred to in the preceding instance. Like *B. pictus* it is a scarce insect even on the continent, and seems to prefer a more southern climate to ours.

BOMBYLIUS MINOR. (s.)

Linn. Donovan's Brit. Ins. xv. pl. 536; *Meigen*, ii. 201—Bomb. venosus, *Mikan*; *Meigen's* Klassif.

Considerably less than any of the preceding; the body black, covered throughout with soft yellowish hairs: whiskers (mystax) ferruginous, black at the sides: forehead of the females clothed with reddish yellow hairs; antennæ and proboscis black. Halteres dark-brown: wings somewhat greyish, the base and outer border tinged with light yellowish brown: legs pale ferruginous, the tarsi obscure. 4 lines: proboscis nearly $2\frac{1}{2}$.

This is one of the most common species of the genus, and appears to be the only one that extends far to the north. It occurs in some plenty, in the month of June, in many places near Edinburgh, such as the base of Arthur Seat, fields about Duddingston, and has been taken in Perthshire and other more northern counties.

In England it appears to be rather local, but abounds in certain situations. Captain Blomer was accustomed to take it plentifully in Bradley and Cleve Woods, near Teignmouth and Bideford, Devon; and also in Wales. It has likewise been observed at High Bickington by Mr Cocks—at Shanklin Chine by Mr Rudd, &c. According to Captain Blomer's Journal, it seems to be in June and beginning of July that it appears in greatest force. "Avondale, county Wicklow, Ireland, taken once." *A. H. Haliday, Esq.*

BOMBYLIUS CTENOPTERUS (s.)

Mikan, Meigen, ii. 204; *Macquart's* Diptères, 382.

Brown, the male clothed with fulvous hairs, the female with whitish yellow hairs: hypostome, whiskers and forehead grey: halteres white: wings nearly transparent, tinged with yellow at the base, and a considerable way along the exterior border, the marginal nervure strongly ciliated at the base: the basilar cells of equal length, whereas in all the species previously described they are un-

equal. Legs yellow, the tarsi dark-brown. $4\frac{1}{2}$ lines; proboscis about half that length.

"Devon, Mr J. Cocks, and near Perth," *Curtis' Brit. Ent.* "Dover, July 1826." *Mr Ingpen.*

BOMBYLIUS CINERASCENS.

Mikan, Monog. pl. iii. Fig. 10; *Meigen*, ii. 212.

This small species, which, according to Mr Stephens, has occurred in Britain, is thus described by Mikan, to whom we are indebted for a monograph of this tribe of Diptera: whiskers black above, grey beneath: body black, covered throughout with ash-grey hairs: wings transparent, the base black: halteres black: thighs with grey pubescence; tibiæ brown; tarsi black. $2\frac{1}{2}$ lines; proboscis $1\frac{2}{3}$.

GENUS—PHTHIRIA.

Antennæ somewhat shorter than the head, approximating at the base, and directed sideways; first joint short and cylindrical, with a few hairs on the outer side; second cup-shaped and slightly pubescent; third fusiform and compressed, nearly double the length of the two others taken together, and having a very short bifid style at the apex; proboscis at least as long as the head and thorax; labrum grooved beneath; palpi thick and club-shaped, concealed within the cavity of the mouth: head spherical, the forehead prominent; ocelli three; abdomen obtusely conical: wings of moderate size, the submarginal cells nearly straight; first posterior one open; anal cell closed at the extremity and slightly petiolated: legs long and slender.

This genus includes a few small insects which were formerly referred to Usia of Latreille and Volucella of Fabricius. "The principal relations which they have with the Bombylii," says Macquart, "consist in the length of the proboscis, the approximation of the antennæ at the base, and in the form of the third joint of these organs; but more considerable differences give them a peculiar habit, and render their affinity liable to be misunderstood. The spherical form of the head, and conical shape of the abdomen, the shortness of the first joint of the antennæ, and finally the reticulated appearance of the wings, remove them more or less from the bombylii: in the latter character, indeed, they deviate from the greater part of the family. The nervures are not sinuous as in Anthrax and Mulio; the first cell of the hinder border is not closed as in the Bombylii; and the anal cell, contrary to what takes place in the genus just named, is closed at its extremity, as in Usia and Geron.

Finally, the wings assume an appearance very similar to those of the Empides."*

As is the case with the Bombylii, we are still unacquainted with the previous states and metamorphoses of these insects.

Phthiria pulicaria.

Meigen, ii. 219; *Macquart*; *Curtis*, Brit. Ent. pl. 521.—Bomb. pulicarius, *Mikan*, Monog. pl. iv. fig. 14.—Volucella campestris, *Fallen*.—Phthiria nigra, *Meig.* Klass. pl. x. fig. 11.—Phthiria pygmaea, *Latr.* Gen. Crust. iv. 3.4.

Male: deep black; the hypostome clothed with white hairs; forehead black: the abdomen more or less invested with whitish hairs; halteres dark-brown: wings nearly hyaline, the stigma brown; legs black.

Female: not so deep black as the other sex; the hypostome white, and the forehead, which is wide and of a dark-brown-colour, has two white spots anteriorly; thorax with a white stripe on each side, the sides of the breast greyish, with two white spots; scutellum black, marked with a pale yellow point at the hinder extremity; halteres white; wings purely hyaline. $1\frac{1}{2}$ line.

This appears to be everywhere a rare insect, and was not known to inhabit this country till lately, when it was found by Mr Curtis at Covehithe, in Suffolk.

Genus PLOAS.

Antennæ about the length of the head, placed close together at the base, diverging above; first joint thick, conical, and hairy; second cup-shaped, hairy; third rather long, slender, naked and fusiform, slightly compressed, and terminating in a short two-jointed style: proboscis not much longer than the head: palpi cylindrical, terminating in a small sharp point: labrum nearly as long as the proboscis, obtuse; tongue as long as the proboscis, and pointed: eyes contiguous in the male, remote in the female; the crown with three ocelli; thorax oval, the surface elevated: wings with three submarginal cells, the first posterior one open; legs slender.

The most distinctive character in this genus, which was established by Latreille, is the thickness of the radical joint of the antennæ. The proboscis also is much shorter than in the other members of the same family, so that the insects are obliged to settle on the corolla of flowers to obtain food, instead of sipping it while on

* Dipterès du Nord de la France.

the wing like the bombylii. Very few species are known; and although that described below has been admitted into our indigenous lists, the fact of its being a native requires confirmation.

Ploas virescens.

Meigen, ii. 231. pl. 19, fig. 6.—Ploas hirticornis, *Latr.* Gen. Crust. iv. 312, pl. 15, fig. 7.—Bomb. Maurus, *Mikan*, pl. 4, fig. 13.—Conophorus Maurus, *Meigen*, Klassif. pl. 10, fig. 17.

Surface of the body obscure green, nearly black, invested with greyish hairs; forehead whitish in the male, with fulvous hairs in the female; first and second joints of the antennæ greyish-brown, with very long black hairs; third joint black. Hairs on the thorax ferruginous; sides of the breast whitish; scutellum small, shining black and naked: abdomen rather broad, blackish green, clothed with ferruginous hairs; that of the male with alternate tufts of white and black hairs on the sides: wings brownish at the base, the transverse nervures likewise bordered with brown: tibiæ yellowish, the thighs and tarsi somewhat obscure. 3—4 lines.

The principal station of this insect seems to be in the South of Europe; but it has been found as far north as Paris; and specimens in the British Museum are said to have occurred in this country.

Family—CONOPIDÆ.

Antennæ three-jointed, angular at the base, the third joint with a terminal style; proboscis long and slender, geniculated at the base; ocelli wanting; thorax without a cross suture; abdomen curved inwards at the extremity, and consisting of six segments in the female, and seven in the male.

As constituted by Dr Leach, and adopted by several other authors, the family Conopidæ was made to include the genera arranged below as a distinct group under the name of Myopidæ. This separation was first made by Macquart, and is rendered necessary by the important difference of character which they present, as will be seen by comparing the respective descriptions. As it now stands, the present family is restricted to the old genus Conops of Linnæus.

Genus CONOPS, *Linn.*

Antennæ rather longer than the head, inserted on a frontal protuberance, placed close together at the base and diverging at the apex, the radical joint short, slender, and cylindrical, forming an angle with the second, which is horizontal and elongated, increasing in thickness from the base, and forming with the third a compressed club, ending

in a point; style three-jointed, first joint short and indistinct, second dilated, and having a pointed appendage at the apex turned downwards, third longer and tapering to a point (Fig. 2); proboscis hori-

zontal and directed forwards: labrum slender and rigid: the tongue rather longer and likewise very slender; labrum slenderest in the middle, and terminating in two lobes (Fig. 4:) palpi very small, truncated and pilose: head very large, the crown transparent and without ocelli: forehead wide in both sexes: abdomen usually much narrowed at the base, and curved downwards at the hinder extremity; the fourth segment in the male provided with a curved horny appendage on the underside: legs rather long and robust; the thighs slightly compressed before the apex: wings scarcely reaching to the apex of the abdomen, laid horizontally along the body when at rest, the first posterior cell closed and pediculated; the anal one elongated. (Fig. 6)

The insects of this genus have a very peculiar aspect, arising from the great size of the head, narrow base of the abdomen, and the incurvation of its extremity, which renders them little likely to be confounded with other tribes even by the most inexperienced observer. Their prevailing colour, which is black with marks and bands of yellow, gives them at first sight something of the appearance of wasps or small ichneumons. They are autumnal insects, seldom appearing in force before August, and the more common kinds continue to frequent the common ragwort and other late flowering plants till the end of October. Notwithstanding the formidable appearance of the long exserted proboscis, their habits are quite innocuous, the whole of their sustenance being derived from the juices of flowers. Baumhauer was the first to discover that the larvæ are parasitical, and that they live in the bodies of humble bees. Latreille has witnessed the species named rufipes issue in its adult state from the body of a bee by the incisures of the abdomen, and similar observations have been made by other naturalists. Upwards of twenty different kinds are known, only eight of which appear to inhabit Britain.

Conops vesicularis.

Linn. Fabr. Meigen, iv. 209.—Conops cylindrica ♂. *Meig.* Klass.

Hypostome ferruginous, the eyes bordered with a bright yellow line: forehead ferruginous anteriorly with a black longitudinal line widened at the lower extremity; the vertex brown and transparent; antennæ ferruginous; thorax dark-brown, the shoulders and scutellum testaceous: abdomen in the male nearly cylindrical, the two first segments black, narrowly edged with fulvous, the third with a fulvous band becoming yellow on the sides, fourth fulvous, black at the base; the two last entirely fulvous; abdomen of the female contracted at the base, ferruginous, the first segment brown with a fulvous line, second brown with a yellow band behind, the third black at its anterior edge: legs ferruginous: wings reddish brown at the exterior edge, and pale towards the extremity. 6–7 lines.

A scarce species; it has occurred near London and in a few other places. "I have taken the male in the New Forest, and on Knighton Heath, Dorset,—dates May 22, 1835, and June 10, 1829." *J. C. Dale, Esq.*

Conops flavipes. (s.)

Linn. Fab. Panzer. Faun. Germ. lxx. fig. 21, 22.—*Meigen*, iv. 122.—Conops macrocephala, *Samouelle's* Comp. pl. ix. fig. 9.—Conops vesicularis, *Harris*, Expos. pl. xx. fig. 1.—Conops trifasciata, *De Geer.* ♀.

Head fulvous, with a brownish transparent vertex, from which a broad black band extends to the base of the antennæ, the latter black; thorax black with a yellow callosity on each shoulder, and another on each side of the metathorax; scutellum bordered with yellow: abdomen a little contracted at the base, black, the second and third segments in the male, and the second, third, and fourth in the female, with a yellow posterior band; the first in both sexes, with a yellow spot on each side, and the two anal segments ash-grey inclining slightly to yellow: halteres yellow, legs also of that colour, the posterior half of the thighs black, and the tarsi brown at the apex: wings tinged with brown, deepest at the outer margin. 5 lines. *(Wood-cut, fig. 5.)*

This is the most plentiful species of this tribe in Britain. It seems to occur in all parts of England, is rather plentiful in the south of Scotland, and has been traced as far north as Aberdeenshire. In Scotland it seldom appears before August, and is then usually observed on the common ragwort *(Senecio Jacobæa,)* but in the more southern parts of the island it may be found much earlier. It varies a little particularly in the breadth of the abdominal

fasciæ. "I find this insect to be common at Glanville's Wootton, and other places, such as Eslington wood, Caundle Holts, &c." *J. C. Dale, Esq.* "Cambridgeshire. In one of my specimens the abdomen is entirely bright yellow above, with the exception of the incisures of the segments, which present each a narrow line of black. Is this a mere variety, or a distinct species?" *Rev. Leonard Jenyns.* "Needwood Forest, Staffordshire. August 1828." *C. C. Babington, Esq.* "Near Twizel." *P. J. Selby, Esq.*

Conops quadrifasciata.

De Geer, vi. pl. 15. fig. 1.—*Meigen*, iv. 123.—Conops aculeata, *Fabr.*

Similar to the preceding species; hypostome fulvous, with a play of bright yellow on the sides; forehead reddish-brown above, black over the antennæ, the latter likewise black: thorax black with two yellow callosities on the shoulders, the sides of the breast and metathorax with changeable spots of bright yellow; scutellum entirely black: abdomen yellow with four black bands; the first segment being black, with a yellow callosity on each side, and the hinder margin yellow; second black edged with yellow; third similar, but the yellow band wider; fourth yellow with a narrow black band; fifth almost entirely yellow; sixth yellow: halteres yellow; legs reddish-yellow; the tarsi dusky at the extremity; wings nearly hyaline in both sexes. 5 lines.

Of pretty frequent occurrence in the south of England, but scarce in most other parts of the country. "Common at Glanville's Wootton, and other places in this neighbourhood." *J. C. Dale, Esq.* "Near London." *Stephens' Catal.* "Birchwood, Southgate, &c." *Curtis, Brit. Ent.* "Woods at Tollymore, ascent of Mourne Mountains, county Down." *A. H. Haliday, Esq.*

Conops aculeata.

Linn. Meigen, iv. 124.—Conops macrocephala, *Harris*, Expos. pl. xx. fig. 2, 3. —Conops scutellata, *Meigen*, Klass.

This insect so closely resembles the preceding, that, with a very few exceptions, the same description will apply to both. Head ferruginous; forehead with a black band, the spot on the crown reddish-brown; antennæ and thorax black, the latter with a yellow spot on the shoulder, and another behind the insertion of the wings; the sides of the breast with two marks of changeable yellow, having a fine silky lustre; scutellum yellow: abdomen black with five yellow bands; legs reddish-yellow, the apex of the tarsi tinged with

brown: wings having a brown stripe along the outer border but not reaching to the apex. $4\frac{1}{3}$ lines.

Has been found near London, but we have not heard of any other British localities.

Conops macrocephala.

Linn. Fabr. Meigen, iv. 125, pl. 36, fig. 27; *De Geer*, vi. 263; *Curtis'* Brit. Ent. pl. 377.

Larger than any of the preceding; black; head and antennæ ferruginous; face yellow, with a brown streak extending from the crown to the antennæ, and a triangular mark of the same colour below them: thorax with a whitish changeable spot on each shoulder: abdomen having all the incisures yellow or whitish-yellow, the first segment swollen; the second long, and tapering to the hinder extremity, the remainder forming a thick incurved club: halteres and legs ferruginous; the coxæ and base of the thighs dark-brown: wings with a broad testaceous stripe along the outer margin. 7 lines.

Rare: "The specimen figured by Mr Curtis was taken by me on 18th August 1824, in my own field at Hurne, Hants, in company with others of the genus. Mr Davis writes me that he took another example in Darenth wood, Kent, but I have not yet been able to compare his specimen with mine, to determine their specific identity." *J. C. Dale, Esq.* No other British locality has hitherto been discovered, as far as we know.

Conops nigra. (s.)

De Geer, vi. p. 105, pl. 15, fig. 9; *Meigen*, iv. 126; *Herbs*, Gemein Naturg. viii. 117, 5, pl. 70, fig. 5.

About the size of the preceding: head reddish-yellow; the forehead with a black stripe, and the hypostome with four narrow black lines: region of the mouth likewise black: antennæ ferruginous: thorax entirely black, with a small indistinct spot with a yellow play of colour within each shoulder: abdomen likewise black; the hinder margin of the first and second segments with a very indistinct narrow ring of a somewhat paler hue than the rest, the narrowest part at the base of the third segment: legs ferruginous; the coxæ and base of the thighs black. Halteres yellow, blackish at the base: wings with a broad testaceous stripe covering the anterior half.

This species is certainly pretty closely allied to *C. macrocephala*, but it appears sufficiently distinct. Little notice seems to have

been taken of it since the time of De Geer, by whom it is figured and described. Like many others of its tribe, it is partial to northern climates, and it is probably not very scarce in Sweden. In this country the only example that has occurred was taken by Sir William Jardine, on the northern coast of Sutherland, in the summer of 1834.

Conops rufipes. (s.)

Fabr. Meigen, iv. 127.—Conops petiolata, *Donovan's* Brit. Insects, xiii. pl. 451.

This species differs from all the rest in having the abdomen very narrow at the base, so as to appear placed on a long peduncle. Head fulvous: forehead with a broad black line, and the hypostome with three abbreviated lines of that colour: antennæ reddish-brown: thorax black, with two whitish points below the shoulders: abdomen with the narrow portion at the base ferruginous; the third and fourth segments each with a broad black band: legs ferruginous; the extremity of the tarsi dusky; the hinder coxæ marked with a silvery white spot: halteres bright-yellow: wings with a broad reddish-brown stripe covering the anterior half. 5 lines.

The markings of the abdomen are somewhat variable: the third and fourth segments are frequently bright-yellow behind, and the anal segments more or less tinged with that colour. The insect is one of the more common kinds, especially in the southern parts of the country; it seems rare in Scotland. "Dalmeny." *Rev. William Little.* "I take *C. rufipes* in Plumley wood, Caundle Holts, &c. in the beginning and middle of August." *J. C. Dale, Esq.* "Gamlingay wood, Cambridgeshire, August." *Rev. Leonard Jenyns.* "Devil's ditch, Newmarket Heath, July 1833; likewise near Bath." *C. C. Babington, Esq.* "In plenty on umbelliferous flowers by the side of a field, close to a plantation at Hetheselt, Norfolk." *Henry Brown, Esq.* (in Curtis' B. E.) "London district." *Stephens' Catal.*

Conops ceriæformis.

Megerle, Meigen, iv. 132, pl. 36, fig. 26.

General colour black: hypostome reddish-yellow, with a pale-yellow play of colour round the eyes; forehead black, the crown brownish; antennæ nearly black: thorax of that colour, with a yellow callosity on each shoulder, and a yellow spot on the metathorax: abdomen nearly cylindric, black: the hinder margin of the four first segments ornamented with a yellow band: halteres yellow: legs ferruginous; the thighs black in the middle: the tarsi dusky at the apex: wings transparent, with a pale brown streak in the middle of the anterior margin. 5 lines.

Rather a scarce species, but occurring at times in the vicinity of London, and in some other parts of England. "I took it in Darenth wood in 1826, in the beginning of August." *J. C. Dale, Esq.*

Family MYOPIDÆ.

Antennæ with the second joint longer than the third; the style dorsal, and consisting of two joints: proboscis long and slender, generally geniculated at the base, and near the middle: ocelli three; face usually very much dilated; the eyes rather small: winglets minute; wings lying along the body; the first posterior cell usually somewhat open, the anal one generally elongated.

As above defined, this family comprehends only two British genera, viz. Myopa and Zodion, which are readily distinguished from each other by the former having the proboscis geniculated at the base and middle, and the latter by having it bent at the base only. The presence of ocelli, and other prominent characters separate them decidedly from the Conopidæ, to which, however, they bear some resemblance in the shape of the body.

Genus MYOPA.

Antennæ with the first joint short and cylindrical; second rather long, somewhat thickened at the tip, and compressed at the base; third rounded-ovate, with a short two-jointed style on the back: proboscis geniculated at the base and middle; labrum, tongue, and palpi variable, the latter generally somewhat elongate and fringed with hairs: inferior part of the face inflated; the forehead wide in both sexes; eyes rather small: ocelli three: thorax robust; abdomen consisting of six segments, somewhat narrowed at the base, the extremity obtuse and curved inwards; the fourth segment dilated beneath: legs rather strong, thighs somewhat thickened, the claws and pulvilli much developed: wings lying along the back when at rest; the anal cell straight.

About twenty species belong to this genus, but scarcely more than a third of these have hitherto been found in Britain. The remarkable dilatation of the lower part of the face, in connection with the incurved abdomen, and rather short strong legs, give them a very peculiar aspect. The prevailing colours are rust-red and brown. Although much similarity pervades the species in respect to colour and marking, the structure of the oral organs undergoes considerable modifications, as is occasionally pointed out in the subsequent descriptions of the different species. We are still unacquainted with the larvæ, but from the analogy which exists between

the perfect insects and the Conopidæ, it is not unreasonable to infer that they are parasitic, like those of the tribe just named. The flies derive their nourishment from the juices of flowers. We may expect that the following list of native species will ere long be considerably augmented by the discovery of kinds which have hitherto been overlooked in this country.

Myopa picta. (s.)

Panz. Faun. Germ. liv. 22; *Meig.* iv. 140.

Hypostome white spotted with black, the hinder part of the head with four greyish spots, forming a curved line: forehead ferruginous, the crown dusky-brown; antennæ likewise ferruginous; the third joint black: thorax dark grey, with longitudinal stripes of deep brown: abdomen testaceous-brown, varying with light-grey reflections, and marked along the back with a row of dark points: legs pubescent, testaceous; anterior thighs black, with the tip ferruginous: tibiæ ciliated, and marked with four dusky rings. Halteres white; wings brown, spotted with white. $3\frac{3}{4}$–4 lines.

A scarce insect, but occurring at times on flowers. It is observed occasionally near London; and we once found a specimen in the Edinburgh Botanic Garden.

Myopa buccata.

Fabr. Meig.—Conops buccata, *Linn.*

Usually somewhat less than the preceding: hypostome white, without spots; forehead dark-brown spotted with grey; antennæ entirely testaceous: thorax dark-brown, with ash-coloured bands, the shoulders and sides testaceous; scutellum dark-brown: abdomen nearly testaceous or reddish-brown, with light grey reflections, especially on the sides; the anal segments reddish-brown in the males. Legs ferruginous, the thighs with a single dark ring, and the tibiæ with two, one near the middle, and the other at the apex: tarsi tinged with yellow: wing-scales white; halteres pale yellow: wings brown, with pale spots. 3–$3\frac{3}{4}$ lines.

Likewise one of the rarer species, of which we have been able to ascertain very few localities. It has been taken in the London district, but not frequently.

Myopa testacea. (s.)

Fabr. Meig.—Conops testaceus, *Linn.*—Conops buccata, *Gmelin*, v. 2895.

Very closely related to *M. buccata*, but distinguished by a few obvious characters. The inflated portion of the face is white and unspotted, but there is a distinct brown mark on each side, near the

margin of the eyes below the antennæ; the latter wholly testaceous, the terminal joint appearing of a lighter hue, owing to the absence of the black hairs, with which the others are covered. Thorax black, with ash-grey lines; the sides, shoulders, and usually the scutellum reddish, or pitchy brown: abdomen and legs nearly as in *M. buccata*; the dark rings on the latter more or less distinct, the femoral one frequently almost effaced. Wings brownish, each of them with a distinct blackish-point on the cross nerve near the centre. $3\frac{3}{4}$–4.

This insect seems to appear not unfrequently, but at somewhat uncertain intervals, and on some occasions we have observed it in great profusion. This was particularly the case in the neighbourhood of Edinburgh, in the summer of 1835, when scarcely a flowering plant, especially of the umbelliferous kind, could be examined without finding specimens. On ordinary occasions, it occurs pretty frequently, apparently in most parts of England and Scotland, and also in Ireland. It is best distinguished from its associates by the brown mark beneath the eye, and the dark discoidal spot on the disk of the wings. "Bottisham, Cambridgeshire, on the flowers of the barberry; also near Cambridge." *Rev. L. Jenyns.* "Near London." *Stephen's Catal.* "Holywood on Belfast Lough, county Down; not common." *A. H. Haliday, Esq.* "Jardine Hall, 1837." *Sir W. Jardine, Bart.*

Myopa dorsalis. (s.)

Fabr. Meigen.—Conops testacea, *Gmelin*—Myopa ferruginea, *Panzer*, Faun. Germ. xxii. 24.—Conops cessans, *Harris*, Expos. pl. xx. fig. 4.

Prevailing colour testaceous; face reddish-yellow, with lighter reflections; forehead brown: antennæ reddish-brown: (upper lip very short, the palpi elongated and cylindrical;) thorax brown or blackish on the surface, the shoulders and sides of the breast inclining to testaceous: abdomen wholly of the latter colour, rather broad and depressed in the male, the first segment somewhat dusky, the others with pale grey reflections at the incisures; halteres pale yellow; wing-scales white; wings light-brown, inclining to yellow at the bases; legs wholly testaceous, the tarsi paler. $5\frac{1}{2}$–6 lines.

Not a scarce species, occurring on flowers in the months of July and August.

Myopa ferruginea. (s.)

Fabr. Meig.---Conops ferruginea, *Linn.*---Conops buccæ, *Harris*, Expos. pl. xx. fig. 5-9.

Similar to the preceding, but usually rather less. Head fulvous,

with light reflections on the sides of the hypostome ; forehead having a black point ; antennæ reddish-brown : thorax dark-brown above, the colour disposed in three broad stripes : abdomen narrow and cylindrical, the basal segment, as well as all the rest, ferruginous with grey incisures ; the second segment is a good deal elongated, and the terminal ones are very much incurved in the male. 5 lines.

Likewise of frequent occurrence, at least in many parts of the country. In Scotland we notice it every summer in the neighbourhood of Edinburgh and in Roxburghshire, and have seen specimens from other southern counties. " London district." *Stephen's Catal.* " Bath." *C. C. Babington, Esq.* " Near Twizel." *P. J. Selby, Esq.* " Dundrum, a sandy beach below the Mourne Mountains, Ireland, taken once," *A. H. Haliday, Esq.*

Myopa fasciata.

Meig.—Myopa ephippium, *Fabr.*—Conops fusca, *Harris'* Expos. pl. xx. fig. 6, 7 ?

A handsome species, and easily distinguished from its associates by its dark-coloured abdomen, ringed with white : face yellow ; forehead with two brown stripes and a shining yellow triangular mark on the crown ; antennæ reddish-brown ; the third joint appearing paler : thorax blackish, the shoulders and sides brown : abdomen black ; the second and third segments edged with white behind, and on the sides ; the fourth segment with two black spots anteriorly, all the rest white : halteres pale yellow ; legs fulvous-brown, the tibiæ having a dusky ring near the middle : wings of a uniform brownish colour. 3–4 lines.

Apparently somewhat scarce in Britain, but frequent on many parts of the continent. " Near London." *Stephens' Catal.* " Kenmare, Ireland." *A. H. Haliday, Esq.*

Myopa atra. (s.)

Fabr. Meig.—Myopa annulata, *Fabr.* Antl. Syst.—M. cinerascens, *Meig.* Klass. i. 287.—M. maculata, do. 288.—M. micans, do. 289.

Very dissimilar to any hitherto described, both on account of its small size, obscure colours, and somewhat peculiar facies ; it appears also to differ in some measure in its habits from the other species. Black ; face yellow, with a silvery-white play of colour ; vertex brown ; antennæ (which are rather long in proportion to the size of the body) black, the second joint, and base of the third fulvous on the inner side : upper lip elongated, tongue very long. Tho-

rax cinereous, with three black lines, the central one double in the female: abdomen shining black in the male, ash-grey in the female; the second, third, and fourth segments edged with grey in the former sex, and a black dorsal streak along the first four segments in the latter: legs black; the hinder thighs, and occasionally the others also, more or less fulvous: tibiæ sometimes yellowish at the base. Halteres white; wings slightly tinged with brown, the base yellowish, strongly iridescent. $1\frac{1}{2}$–$2\frac{1}{2}$ lines.

Varies considerably, which has caused a variety of names to be applied to this species. It is a common insect in most places, and, besides occurring in flowers, is often seen running about warm banks exposed to the sun. Near London, plentifully in some situations. Neighbourhood of Edinburgh, &c. "Everywhere in Ireland, on sunny banks." *A. H. Haliday, Esq.*

MYOPA PUSILLA.
Megerle, Wiedemann, Meigen.

Antennæ blackish, reddish internally towards the apex: hypostome yellow, with a white play of colour; forehead testaceous: thorax shining blackish-grey, with two black lines dilated behind into a triangular spot: abdomen black, with large light-grey spots on the sides: wings brownish towards the costa: legs shining black: hinder thighs at the base and the knee reddish. $1\frac{1}{2}$ lines.

We have noticed this insect as it is said to have been taken in the vicinity of London, but there can be little doubt that it is a mere variety of *M. atra*.

III.—*On the existence of a second membrane in the Asci of Fungi.*—By the Rev. M. J. BERKELEY, M. A. F. L. S. Plate VII.

M. MORREN, in a memoir of the highest physiological interest, (Ann. de Sc. Nat. N. S. Vol. v. p. 257.) has lately made known in the short filaments of Closteria, a genus formerly referred to the Infusoria, but most certainly, according to his most interesting observations, belonging to the order Algæ, the presence of three distinct membranes. The external hyaline tube is closely lined with a delicate flexible membrane; besides which there is a third sac proper to the green mass of granules and vesicles. It should seem from the analogy of this genus with *Zygnema*, that the individual Algæ are rather to be considered as extremely reduced threads, than as frustules; in other words, the genus is rather confervoid than diatomaceous; and therefore their relation to the asci of Fungi is per-

haps less complete than if the converse were the case. For Monema, a diatomaceous genus, greatly resembles certain asci with their included sporidia; and I have pointed out in the English Flora the curious analogy between the asci of Sphæria entomorhiza and S. ophioglossoides, and the filaments of Schizonema.

Be the analogy, however, what it may, between individual Closteriæ and the asci of Fungi, the point to which I now wish to draw attention is the presence of two distinct membranes in the latter organs, besides the proper integument of each sporidium, viz. the external hyaline tube, and a second, answering to the secondary membrane of Closteriæ, which at first lines the former closely, but is at length more or less detached.

The species in which I have seen this most distinctly, are a form of Sphæria populina, Pers. growing in winter and spring on small fallen branches of ash, and Sphæria pedunculata, Dicks. and Sow. referred in the English Flora, on the inspection of dry specimens, as a variety to Sphæria hypoxylon, but now proved by the detection of recent individuals on the dung of rabbits more or less buried in ant-hills to be a very distinct species, remarkable for several peculiarities of structure, which will be adverted to in what follows. The fact, however, being once satisfactorily established in these species, it was clear, from certain anomalous appearances in the contents of the asci of various Fungi, that it existed very generally. More especially I have recognized its existence in Sphæria phæocomes, Reb. (which I have lately found with perfect asci and septate sporidia); an undescribed species detected by Mr D. Stock, on Arenaria peploides; and Patellaria atrata, Fr. In many other cases I have ascertained the presence of a secondary membrane more or less distinctly; and I have no doubt that it exists in all asci which are surrounded by a distinct transparent border.

On submitting to the microscope some of the gelatinous contents of the perithecia of Sph. populina, var. which had been previously moistened, and gently crushed with the point of a lancet, I perceived that some were snapped asunder, and that from the centre of the fractured part a little hyaline tube projected very much in the same way as is frequently the case in Dentalium entalis. (See Deshayes, Monog. t. 2, f. 2.) This attracted my attention more particularly, and after examining numerous asci I found that it arose from the projection of a fractured portion of a secondary membrane immediately enveloping the sporidia, which did not give way so soon as the external tube, which appears to be exceedingly brittle. It is highly transparent, capable of considerable dilatation, but at the

same time very contractile, so that when yet *in situ*, it frequently becomes nodulose from the pressure of the sporidia, especially if they get out of their natural position, which is mostly, though not universally, with their major axis parallel to the asci. The portion which projects after the asci are fractured, if empty, is generally contracted to a mere thread. In several instances, when the outer tube has been snapped asunder, I have seen a large portion of the inner tube projecting, and in one case it still retained three sporidia. Similar appearances presented themselves in Sph. pedunculata, but, from the circumstance of the sporidia being enveloped in a pellucid mucus, the structure is not always easily made out. The secondary membrane in general adheres very closely to the sporidia, adapting itself to their form, so that the row of sporidia when not as yet disarranged presents a moniliform articulated thread; the dark apparent articulations arising probably from the mutual pressure of the sporidia with their mucous coats against each other. Indeed, from the manner in which the sporidia adhere together when the asci are ruptured, I am inclined to think that the secondary membrane is in the present species so extensible, as to form a close covering to the sporidia, however much they may be disarranged. This is not, however, always the case, as the secondary membrane is sometimes perfectly distinct, both before and after the rupture of the asci. This I have seen especially in a remarkable variety, or rather form of the species, in which the receptacle is reduced almost to nothing, and the perithecium solitary. Besides the curious circumstance of the sporidia being coated with mucilage, a circumstance, as far as I know, without parallel in the genus, it is remarkable that they have another equally distinguishing feature, which is the existence of a regular longitudinal depression on one side, so as to resemble very strongly such pollen grains as have a single band. This is best seen when they are divested of their mucilaginous coat, which appears to be uniformly the case before they are discharged. It is by no means common amongst the uterine Fungi to have any inequalities in the coat of the sporidia, except such as are septate. At present I recollect but a single instance in the genus Ascobolus, in which I have seen them very strongly wrinkled. They vary remarkably in form, as will be seen from the accompanying figures, and in some specimens which, in addition to the usual coating of earth, had penetrated through a layer of cow-dung, it is most curious, in consequence, I suppose, of excessive nourishment, the sporidia were uniformly more than twice the ordinary size.

The primary membrane, though sometimes rather rigid, is by no

means universally so. Sometimes it is extremely tender and almost gelatinous, so that if a portion of the inner tube with its sporidia be bent at any part by any peculiar position which the sporidia acquire, the outer tube is also forced outwards, and in consequence the asci are sometimes curiously distorted. In some cases they appear torulose, from the pressure of the inclosed sporidia, and occasionally when the sporidia assume by accident a transverse position in the tube, I have seen the whole vessel regularly dilated. The apparent thickness of the walls of asci arises in general from the existence at a certain period of growth of a space between the two membranes, and the great difference of thickness at different parts is now easily explained from the greater contraction of those points of the secondary membrane. This is, I believe, attached to the primary at the apex. In S. pedunculata it certainly is, in which species there is almost always an articulation a little below the point of attachment.

M. Morren's paper is, if I mistake not, calculated to throw light upon the developement of the sporidia themselves. In an early stage of growth the asci contain a mere grumous mass, out of which, probably at the expence of the greater part of the granules of which it is composed as its organization becomes more evident, the sporidia arise. The coat of the sporidia is frequently absorbed before they are discharged, and the asci then contain a number of distinct sporules; and sometimes the asci themselves are absorbed, and the whole inner mass of the perithecia consists of sporidia or sporules. These are points to which at present sufficient attention has not been paid, but they would doubtless highly repay the labour of investigation.

Explanation of Figures.

a. Fractured asci of Sphæria populina, var. with the secondary membrane projecting.

b. One more highly magnified. *c*. A single sporidium still more highly magnified.

d. Fractured asci of Sphæria pedunculata, with their sporidia involved in mucilage, and partly covered by the secondary membrane.

e. Portion of one of the asci showing the moniliform arrangement. *f*. Sporidia divested of mucilage.

g. Asci with one of the paraphyses of a variety of S. pedunculata. In one the sporidia are transverse, and the vessel is in consequence regularly dilated.

h. A distorted ascus of Patellaria atrata, with its divided paraphyses. *k*. One of the sporidia.

IV.—*Observations on the Gemmæ of Bryum androgynum.* By George Dickie, Esq. Surgeon, Aberdeen. Plate VII.

Bryum androgynum is of rare occurrence in this neighbourhood. It is found growing in the moist earth which fills the crevices of gneiss rocks, generally along with Bryum cæspititium. Sir W. J. Hooker, in the second volume of his British Flora, p. 57, remarks that this species is very rarely found bearing capsules, and I have never found it in this state: the reason of this seems very obscure. The gemmæ, however, being very plentiful, are quite sufficient to keep up the existence of the species: they are extremely abundant in the months of February, March, and April. These bodies occur in clusters on the summit of a stem bearing much resemblance to the setæ in other mosses; it is, however, of a looser texture, excepting toward its summit, where it presents a swelling and a denser tissue. The swollen part at the summit is easily separable from the rest of the stem, as is represented in Fig. 1, where a part has been removed, the other half remaining with the *cords* which arise from it. The *cords* just mentioned, when viewed under a high magnifier, appear to be transparent tubes composed of a simple membrane; each *cord* supporting a gemma. The gemmæ at the circumference of the clusters are the first to arrive at maturity, those in the centre are developed last of all; and on the same head we find them in several different stages of their growth. At first they are simple transparent vesicles (Fig. 2,) of an oval form, and, by a high magnifier, no matter can be detected in their interior. As they advance in growth a small stalk becomes evident (by this they are attached to the *cords* formerly mentioned,) and a grumous matter is seen within, (Fig. 3.) When fully matured they present the appearance shown in Figs. 4 and 5, and the substance in their interior assumes a granular appearance; it now resembles the matter called green fecula by some authors. The gemmæ drop off as they arrive at maturity, those at the circumference of the head first, and so on toward the centre until at last the *cords* alone remain. It appeared to me to be an interesting matter to determine the process of germination in the gemmæ, but considerable difficulty arising from their very small size, for a single gemma is scarcely if at all visible to the naked eye, (the accompanying figures are consequently very highly magnified,) the following method was employed. A watch-glass was placed in a saucer with its concavity downwards; over it a piece of fine gauze was spread, the size of which exceeded that of the glass, consequently its edges were in

contact with the saucer, into which water was poured, but only in quantity sufficient to preserve the gauze in a moist state; several entire gemmiferous heads of Bryum were then placed upon the gauze over the centre of the watch-glass, and the whole apparatus was kept in a moderately warm place not exposed to very bright light, and covered with a bell-glass. After some days some of the gemmæ were detached and examined with a magnifier; it was found that the contents of many had undergone a remarkable change. The green granular matter had nearly disappeared, and the cavity of each seemed now to be divided by several dark green partitions, (Fig. 6,) and many of them presented a swelling near that part by which they were attached to the *cords*, (Figs. 7 and 8.) At the end of from fourteen to twenty days, it was observed that in many a small transparent nearly cylindrical tube had been protruded from the part which some days previously had presented a swelling; Figs. 9, 10, 11, represent this appearance. It was not confined entirely to those whose granular matter had disappeared, for many in which this was still visible had begun to germinate, and the tube in some cases contained a portion of it. This tube or filament was invariably protruded from the same part in every gemma, and never more than one made its appearance in each. The filaments seemed to be not merely a prolongation of the membrane of the gemma, but appeared to have proceeded from its interior, and to have burst the membrane. In only one instance did I remark that the protruded filament presented an articulated appearance, or rather its interior seemed to be divided by several septæ. After remaining more than a month upon the moist gauze, the gemmæ had made no further progress in germination. This might have been owing to the gauze not presenting a proper medium for their growth, or perhaps rather from exposure to too strong light; at the end of this time also, the green fecula had disappeared in all of them, and they resembled Fig. 6. While engaged in these observations, I remarked, that a leaf of Bryum, which had accidentally fallen on the gauze, and remained there for some time, had thrown out several slender transparent radicles near its place of attachment to the stem, and from the angle between the midrib and the limb of the leaf. May not this be another way in which B. androgynum is propagated? or even this may be true of every moss. Sir W. J. Hooker says, (British Fl. Vol. ii. p. 74,) that from the points of the leaves of Hookeria lucens roots are often emitted.

V.—*On a peculiar structure in Shells; with some observations on the Shell of Sphærulites.* By John Edward Gray, F. R. S., &c. Plate VIII.

In a paper published in the Philosophical Transactions for the year 1833, I have described three kinds of structure found in such shells as had then come under my observation; but since that period Mr G. B. Sowerby has given me an oyster-shell, and Messrs Hudson and Bowerbank have lent me a fossil Sphærulites,* found in the chalk, each of which exhibits a form of structure which I had not before observed, and which may be designated by the name of cellular.

The shells of this structure appear to increase in size in the same manner as others,—the peculiarity consisting in a deposition of one or more series of reticulations, leaving more or less numerous hollow polygonal cells between each of the lamina of which the shell is formed. The two shells which exhibit this formation show it in a very different state and degree of developement. In the Sphærulites the entire parietes of the shell, (or at least the whole that is left in a fossil state, for some naturalists, as M. Deshayes and Desmoulin, believe that, from the form of the internal cast, the inner part of the shell is deficient,) are formed of series of continuous longitudinal and transverse ridges, leaving four-sided cavities, which are hollow in the specimens preserved in chalk, while in those that are found in limestone, they are filled up with infiltrated carbonate of lime. The concentric or transverse plates, which are best seen in a longitudinal section of the valves, and which represent the laminæ of growth, though remarkably regular in appearance, vary in the distance they are apart from each other. They are usually much closer together at the lips of the valves, or, in other words, when the animal has nearly reached its full growth; but sometimes we find them almost equally near in the middle of the cone, which may have been occasioned by some accidental check to the mollusc's regular increase about that period, and which removed or overcome again admitted the animal to progress at its ordinary rate.

* This appears to be the fossil which Mr Mantell has indicated, but not described, under the name of Hippurites Mortonii. I say *appears*, for on going to Brighton to examine his specimen, I could not obtain permission to have it taken from the case to compare it with that here described. It is certainly not a *Hippurites*, since it has neither the solid structure, nor the two internal longitudinal ribs of that genus. It is the shell figured as a fossil *Conia* by Mr Hudson in Loudon's Magazine of Natural History, Vol. ix. p. 103.

When one of these shells is cut across in the axis of the cone, it is then found that the transverse laminæ are continued, and the cells which appeared regular in the longitudinal section, are seen to be rather irregular in size and form, but mostly hexangular or pentangular. They are deposited on these transverse plates, the next transverse plate or lamina of growth being laid over them; and as the cells of the next and every succeeding series are exactly similar in form and numbers, there necessarily results that uniformity which we have mentioned in the appearance of the longitudinal fracture, since the parietes of the cells of the different transverse laminæ appear in that fracture to be as much continuous with one another as the transverse ones really are. An analogous peculiarity exists in some shells of other structures. Thus in the Pinna, and other shells of a prismatic crystalline structure, the transverse prisms of which the outer coat of the shell is formed, appear to be continuous, though they are each formed of the many transverse laminæ of growth which are in succession deposited as the animal enlarges its size: and it is the same with the rhombic crystalline structure.

The outer surface of this shell (Sphærulites) is lamellar and hard, being formed by the agglutinated outer edges of the transverse laminæ of growth; and the inner surface of the cone is covered with a thin hard plate, which is marked with minute close concentric lines more numerous than the transverse plates of the parietes of the shell; and the plate is raised at the mouth of the cone a little above the surface of the lip, from which it is separated by a slight groove.

The mouth of the lower cone has a smooth concave lip as wide, or rather wider than the thickness of the parietes of the shell, and is marked with some radiating branched impressions, exactly like the impressions which one may suppose to be made by a blood-vessel; the slenderer and branched part being directed towards the outer edge of the lips.

A similar structure is to be observed in other species of this genus fossilized in limestone, but from the size of the cells in these, as appears when specimens of the same magnitude are compared, it is obvious that the whole formation was on a much smaller scale; and the cells are always filled with infiltrated carbonate of lime, which makes them appear solid, unless the surface of the specimen is slightly disintegrated, or the fracture is wetted and examined with a lens.

I can scarcely attempt to explain how the parietes of these cells are formed, nor determine if any fluid has, in their living condition,

filled up the cavity between them, though it seems probable that they may have arisen from some peculiarity in the mantle of the animal, developed only when the new laminæ were about to be deposited, and not present or shrunk when the smooth upper surface of the lamina was formed, for it is evident, from the nature of the surface of some specimens, that the parietes of the cells are very gradually deposited on the smooth upper surfaces of the transverse plates of growth. The vein-like grooves above described do not seem to exert any influence over their form, for they are apparently not in any way connected with the distribution of their parietes, while yet they show that there must exist some peculiarity of the mantle to form such peculiar grooves.

These shells, and the Hippurites, have occupied considerable attention of late, on account of the difficulties which arise in determining their place in the animal kingdom; for although evidently bivalvular, yet they differ in several particulars from both the free bivalve shells of the Conchifera and the lamplike bivalves of the Brachiopodes, not having the ligaments nor the apical umbones of the former, nor the numerous muscular scars so characteristic of the Crania, which alone resemble them in form among the latter. Two French authors have attempted to explain this difficulty. M. Defrance and others having observed that the cast on which the genus Birostrites has been formed is always found in the cavity of these shells, and that as there is a space between the cast and the parietes of the shell, M. Deshayes concludes that the Sphærulites are conchifera provided with a toothed hinge and ligament, and allied to the genus Spondylus, the inner coat of which is lost in the act of fossilization. M. Desmoulins on the other hand believes them to be the shelly cases of a new class of animals of which he ventures to give a theoretical description, allying them to the Ascidia, believing the space between the cast and the shell to be filled up with the cartilaginous mantle of the mollusc. Unfortunately none of the specimens, either from the chalk or the limestone strata, that have come under my notice, exhibit the internal cast as here described, but the specimens from the chalk certainly throw a doubt over both theories, for some have one or more oysters attached to the inner surface of their cavity, and others are pierced with minute branched worm marks exactly like the worm marks so common on the surface of existing shells. These facts prove that whatever may have been the structure of the substance which filled up the space said to have been lost in fossilization, (if any such substance ever was

present in the species under examination,) it must have been lost before the shell was submitted to the fossilizing process, since otherwise the holes could not have been drilled into, nor the oyster shells attached to, the surface.

A somewhat similar structure or appearance is to be observed in some Madrepores, especially in the spaces between the sinuous compressed stars of Meandrina, but in these zoophytes the longitudinal places are continuous and first deposited, and the thin transverse laminæ are interrupted and irregular, instead of forming the continuous plates which they do in the Sphærulites.

Some naturalists have compared the structure with that of Conia and the barnacles, but this must have originated in a very superficial view of the matter, for the valves of the barnacles are pierced with conical tubes gradually tapering from the base to the apex of the valve, and they are not cellular but tubular. The base of some barnacles is indeed cellular, and somewhat resembles the structure in question, but in them the longitudinal or rather radiating plates are continued, and the transverse ones, when present, unequal and disposed irregularly in different directions, showing even a more irregular cellular structure than in the Meandrinæ before referred to.

II. The second form of this structure is found in a recent undetermined species of oyster which I do not know in a perfect state. This shell exhibits the usual lamellar structure of its genus, but the laminæ of growth, which give the peculiar antiquated appearance to the common oyster, instead of being left free, are bent down so as to produce a nearly even outer surface. When these laminæ are broken through, it is ascertained that the spaces under them are filled with a soft purplish spongy mass, composed of minute, rather irregular cells, placed perpendicularly between the plates. When these are near together, the cells extend from one plate to the other, but when they are wider apart, the cells are sometimes interrupted in the centre. They have somewhat the appearance of being casts of the interstices between the prisms of the prismatic structural shells, and are deposited in layers as the other parts of the shell are. I think they may be analogous to the opaque white chalky matter often found interposed between the laminæ of the common oyster, but here, though the chalky matter is sometimes seen on the inside of the exterior imbricate foliations, as the cellular structure is found in the shell under more immediate consideration, yet it is to be observed more abundantly, and commonly forming a convex spot in the disk of the cavity of the oyster, just beyond the scar of the large

central adductor muscle ; and sometimes also forming a raised broad belt near the outer margin of the valve, just within the free lamellar edge. The chalky matter is deposited in these places in a succession of thin plates, perhaps at the periodical interruptions to the animal's growth ; and they are covered over with a hard and thicker calcareous plate, more dense and crystalline also in its composition.

Explanation of the Plate.

Fig. 1. The lip of the lower valve of *Sphærulites Mortonii*, showing the vein-like marks.—2. Part of a longitudinal section of *S. Mortonii*, showing the cancellated structure, nat. size.—3. A longitudinal section of *Ostrea purpurea*, showing the cells on the inner side of the outer plates.—4. A longitudinal section of *Ostrea edulis* showing the chalky matter ; *a*. on the inside ; *b*. on the inside of the outer plates.

VI.—*Localities of Scottish Coleoptera.* By the Rev. William Little.

A considerable number of the insects contained in the following list have not hitherto been recorded as Scottish. Others of them have been noticed as such in several entomological works, but without any precise locality, or authority being given. A few of the rarer species mentioned in Entomologia Edinensis, and Stephens's Illustrations, for which new localities have been discovered, are again inserted here. Several of the localities were furnished by entomological friends, whose names I have attached to their respective discoveries. It is proposed in some future numbers of this work to give short specific descriptions of all the Coleoptera not included in the Entomologia Edinensis.

Leiochiton arcticus. Moffat Hills, Dumfries-shire, where I have taken, at different times, upwards of a dozen of specimens.

Tarus basalis. This insect appears to be widely dispersed, as I have taken it on many of the hills in the west and south of Scotland, and have received specimens from Ben-na-muich-duih, Aberdeenshire.

Agonum emarginatum. Duddingston Loch.
——— atratum. Dalmeny Park.
——— piceum. Ditto.
——— pelidnum. Raehills, Dumfries-shire.

Calathus crocopus. Guillon Links. Andrew Murray, Esq.
Helobia nivalis. Ben Lawers; near the summit.
Omaseus orinomum. Moffat Hills.
Steropus Aethiops. Raehills. In decayed birch-trees during winter.
Patrobus alpinus. Ben Lawers, near the summit. Rare.
Amara plebeia. Raehills.
Harpalus latus. Ditto.
——— rubripes. On the hills near Innerleithen.
Ophonus obscurus. Raehills.
Aepus fulvescens. "Berwick-upon-Tweed, in the crevices, and under slaty rocks between tide marks, never above tide mark, and the greater number of the specimens were procured near low water, but not covered above two hours each tide." Dr Johnston. I have lately found this insect in some abundance, in similar localities near Cramond.
Blemus paludosus. Raehills. Very scarce.
Ocys currens. Dalmeny Park.
Trechus parvulus. Raehills.
——— ruficollis. Moffat Hills.
——— collaris. Ditto.
Tachys binotatus. Raehills.
——— obtusus. Ditto.
Peryphus concinnus. Do.
——— saxatilis Do.
——— cnemerythrus. Banks of the Annan.
——— atrocæruleus. Dalmeny Park.
Lopha minima. Raehills.
——— assimilis. Do.
Tachypus bipunctatus. Dalmeny Park. Very scarce.
——— Andreae. Coast of Argyleshire.
Bembidium paludosum. Borthwick Castle. Andrew Murray, Esq.
——— pallipes. Banks of the Nith, near Dumfries.
Hydroporus frater. Raehills.
——— 12-pustulatum. Do.; and Water of Leith.
——— rufifrons. Dalmeny.
——— marginatus. Raehills.
——— fuscatus. Do.
Colymbetes concinnus. Do.
——— pulverosus. Forfarshire.

Colymbetes oblongus. Raehills.
——— affinis. Do.
Gyrinus minutus. In a pool on Hawick Moor, in considerable abundance. Mr W. Lamb.
——— villosus. In the Jed, near Jedburgh.
Heterocerus marginatus. Dalmeny Park, in marshy ground near the shore.
Hydrochus crenatus. Braid Hill marshes. A single specimen, found along with Hydrochus brevis, the latter in abundance.
Ochthebius marinus. Dalmeny Park, in a marsh by the shore.
Enicocerus Gibsoni. Do. Do.
Limnebius affinis. Raehills.
——— lutosus. In the Annan, near Moffat.
Cercyon bimaculatum. Dalmeny, by the shore.
——— terminatum. Raehills.
——— convexior. Do.
——— ustulatum. Cramond.
Phalacrus aeneus. Raehills, in moss.
——— ovatus. Do.; and Cramond.
——— pulchellus. Do.
Leiodes aciculata. Raehills; Cramond.
——— castanea. Do.; and near Jedburgh.
——— thoracica. Do. The most abundant of the genus.
——— badia. Cramond.
——— polita. Raehills.
——— testacea. Do.
——— ferruginea. Do.; and at Cramond.
——— litura. Do. do.
——— suturalis. Cramond.
——— nigricollis. Do. I find the individuals of this genus chiefly in autumn.
Clambus enshamensis. Raehills.
Ptomaphagus velox. Do.
——— fumatus. Do.
Oiceoptoma sinuata. Corstorphine Hill, near Edinburgh.
Strongylus fervidus. Raehills. Rare.
Campta lutea. Do. abundant in putrid fungi.
Meligethes nigrinus. Do.
Trichopteryx minutissima. Do.
——— nana. Wall top, Barnton Park.
——— perpusilla. Raehills.

Anisarthria melas. Raehills.
——— nitida. Do.
——— nitidula. Cramond.
Atomaria thoracica. Raehills.
——— carbonaria. Do.
——— linearis. Do.
Mycetæa fumata. Raehills. Rare.
Tetratoma Ancora. Wall top, near Cramond. Rare.
Ips 4-pustulata. Raehills; found throughout the year under the bank of decayed fir trees.
— ferruginea. Raehills; found only during summer.
Corticaria transversalis. Raehills.
Paramecosoma bicolor. Cramond Park. Very rare.
Latridius lardarius. Wall top, Barnton Park.
Anthrenus musaeorum. Jedburgh.
Byrrhus aeneus. Raehills. Rare.
Hister 12-striatus. Raehills.
——— nitidulus. Do.
——— rotundatus. Do. About the stables, in June.
Trox scabri. Jardine Hall. Sir William Jardine, Bart.
Phyllopertha Frischii. Guillon Links.
Elater brunneus. Raehills.
——— serraticornis. Dalmeny.
——— semiruber. Raehills, in decayed birch trees during winter. Very rare.
——— balteatus. Raehills.
Hypnoidus agricola.
——— dermestoides. } Do. Banks of the Kinnel.
Cyphon griseus. Do.
Telephorus pulicarius. Raehills.
——— ochropus. Do.
——— lituratus. Do.
Aplocnemus impressus. Do. Rare.
Dasytes æratus. Do.
Cis bidentatus. Do.
Tomicus bidens. Do.; also about Jedburgh.
Hylesinus sericeus. Do.
Baris atriplicis. Halleaths Loch, on rushes. Sir William Jardine, Bart.
Ceutorhynchus melanocephalus. Raehills.
Nedyus floralis. Botanic Garden, Edinburgh.
——— pallidactylus. Raehills.

Nedyus melanostigma. Raehills.
——— Quercicola. Wall top, Ravelstone. Andrew Murray, Esq.
Rhinoncus pericarpius. Raehills.
——— castor. Do.
——— crassus. Do.
Orchestes scutellaris. Do.
——— Ilicis. Do.
Anthonomus pedicularius. Do.
Notaris bimaculatus. Banks of the Nith, near Dumfries.
Pissodes Fabricii. Banks of the North Esk, near Montrose. Mr G. Little.
Orthochaetes setiger. Ravelstone; also in Roxburghshire.
Procas picipes. Near Moffat.
Hypera Polygoni. Cramond.
——— sublineata. Do.
Otiorhynchus maurus. Summit of Hartfell; also in Halleaths Woods.
Trachyphlaeus scabriculus. Blackford Hill.
Strophosomus rufipes. Raehills.
——— nigricans. Cramond Park.
——— retusus. Raehills.
Rhynchites cylindricus. Do.
——— cyaneopennis. Do. Dalmeny Park.
——— cupreus. Do. On the Alder in September. Extremely rare.
Sphæriestes ater. Raehills. On fir-trees, but very rare.
——— fovolatus. Cramond. On the top of a wall under a row of beech and elm trees; found only in October and the beginning of November.
Callidium striatum. Forfarshire. Mr G. Little.
——— variabile. Edinburgh, in a garden in the New Town.
Rhagium inquisitor } Raehills; found in abundance during winter, in decayed fir, and birch trees.
——— bifasciatum. }
Leptura lævis. Lord Torphichen's woods, Mid-Calder.
Macroplea Zosteræ. Loch of Forfar. Dr Macnab.
Galeruca tenella. Raehills.
Mniophila muscorum. Do.
Phaedon aucta. Cramond.
——— unicolor. Raehills. Abundant on the birch.
Chrysomela Hyperici. Dalmeny.
——— Banksii. Ayrshire, Dr Macnab.
——— haemoptera. Hills, North Queensferry. Abundant

Timarcha lævigata. Galloway. Rev. Mr Lamb.
Melasoma aenea. Raehills, on the alder, in August and September.
Cryptocephalus 6-punctatus. Raehills, on the birch. Rare.
——————— Moraei. Sutherlandshire. James Wilson, Esq.
Coccinella ocellata. Cramond, one specimen.
——————— hieroglyphica. Do.
Tenebrio obscurus. Between Leith and Portobello. Dr Knapp.
Phylan gibbus. Southernness. Sir William Jardine, Bart.
Ripiphorus paradoxus. Wall top, Barnton Park, in September.
Scydmænus elongatulus. Raehills. Rare.
Pselaphus Herbstii. Raehills, in April, under stones.
Bryaxis Juncorum. Do. in similar localities.
Arcopagus glabricollis. Do.
——————- puncticollis. Do.
——————- bulbifer. Do.
Bythinus Curtisii. Do.
——————— Burrellii. In moss from Craiglockhart. Dr Greville.
Tachinus elongatus. Near Jedburgh.
Microsaurus lateralis. Dalmeny.
Dianous rugulosus. Raehills.
Syntomium nigroaeneum. Raehills; also near Jedburgh in considerable numbers.
Acidota crenata. Cramond.
Microlymma Johnstonæ. This insect, of which Dr Johnston was so kind as to send me specimens, I have since found at Dalmeny between loose layers of rock.

REVIEWS AND CRITICAL ANALYSIS.

Manuel de Malacologie et de Conchyliologie. Par H. M. Ducrotay de Blainville. Paris, 1825. 8vo. with an Atlas of 100 Plates.

Manuel de l'Histoire Naturelle des Mollusques et de leur Coquilles. Par M. Sander Rang. Paris, 1829. 24mo.

The Genera of Recent and Fossil Shells; for the use of Students in Conchology and Geology. By George Brettingham Sowerby. London, v. y. 8vo.

The Elements of modern Conchology; with Definitions of all the Tribes, Families, and Genera, Recent and Fossil. For the use of Students and Travellers. By William Swainson, Esq. Lond. 1835. Duod.

Elements of Conchology, according to the Linnæan System, illustrated by 28 plates drawn from Nature. By the Rev. E. I. Burrow, A. M. F. L. S. Lond. 1836. 2d edit. 8vo.

The foundations of Conchology were laid by Aristotle on those broad and rational views which characterize all his works on the Natural History of Animals, and which are worthy of his own reputation as a philosopher, and of the inquisitive and intelligent society to whom they were delivered. The structure and habits of the creatures embraced in this section of natural science were the main objects of his study, while their relations to the other animated entities by which they are surrounded, and their own mutual affinities were not forgotten, although undoubtedly the classification of them appears to have been considered a matter of secondary importance, and, such as it is, was rather forced upon him than invented to give some degree of method and generalization to the expression of the results of his inquiries. To censure this Father for the incompleteness, or even his want of a conchological system, is inconsiderately done, for it must be obvious that no system can be otherwise than defective and artificial until discovery has, in a long and lingering progress, collected together a large magazine of ma-

terials, among which there shall at least be found a type of every modification of structure exhibited in the class. But in his age the number of Shells known was very confined, and to have advanced beyond the primary divisions of them into univalves, bivalves, and turbinated kinds, could be of no possible utility, and might have been hurtful to a further progress, for "the over early and peremptory reduction of knowledge into arts and methods" is an error from which, as Bacon has justly remarked, "time commonly receives small augmentation." * His views were higher, and his researches were pushed in the only direction in which they could be made available. He has left us a history of the Cephalopodes remarkable for its fulness and accuracy, and equally remarkable for its exemption from the marvels and puerilities which disfigure the same history as delivered by his successors; and although there may be less of observation and fact in his account of the shelled molluscans, yet we find the same ends kept ever in view, and the incessant effort to attain his object by attention to the habits of the animals, and an examination of their anatomy. The numerous defects, obscurities, and errors which a vain criticism might readily detect in his details under both of these heads, are justly attributable to the accident of position, for he was the first to track the road without the guide of a fixed nomenclature, and without the light which analogy could lend,—anatomy at this period being scarcely practised, and physiology almost unknown. By his own researches he was enabled to characterize several groups of Testacea with some degree of precision, and to acquaint himself with many valuable particulars of their structure and economy, and although some of his general corollaries from these are hasty, yet even in this minor department of study the Stagyrite claims our admiration for his industry and sagacity, and our gratitude for giving us an example of scientific inquiry which it were well to follow.

But the spring which welled so pure and copiously had no issue to its waters. Aristotle had no successor in testaceology among his countrymen; and when literature fled the shores of Attica, and found its unwilling way to Rome, it was unattended by the natural sciences. In the constitution of society among the Romans, it is not difficult to find causes for their total neglect of natural history; and these operated with peculiar force when Pliny began to collect together the materials of his great encyclopædia. Devoted in an especial manner to a public life, the Romans were negligent of a

* Comp. Sprengel Hist. de la Médecine, Vol. i. p. 400.

study, which, so far from enhancing their reputation with the people, required a comparative seclusion to be successfully pursued; while the disrelish for every science requiring a continuous and sober observation of facts and experiments was heightened, at the period we refer to, by a general luxury that had risen to an almost incredible pitch, and by the mental excitability produced by their foreign conquests and discoveries;—for the tales of their travellers, and the new and uncommon animals sent home from every quarter to supply the theatre and circus, had rendered the minds of the people—one and all—pliant to credulity, and apt to receive every monstrous tale, and equally indisposed to attend to the simple phenomena displayed in the ordinary economy of animal life. Pliny largely participated the taste and credulity of his age, and hence his work is the very antitype of the Greeks,—ample in its details of the use and value of pearls and Tyrian purple, of anecdotes of the follies of the rich in their dress, and in their dishes of snails and oysters, &c.; while he caters from every source wonderful stories of the feats of gigantic cuttles, and of the surprising intelligence and habits of these and other molluscans which God verily hath made, in harmony with their lower organization, feeble of instinct and power. To Conchology as a science he has added nothing which Aristotle did not supply; but he furnishes some anecdotes for a chapter on its economical applications, and has graced its history with some tramontane and amusing fictions.

Of the ancients, Aristotle and Pliny are the only names which merit quotation in a history of conchology, and many centuries elapse before we again meet with one whose writings give some indication of its progress. The turmoil of society which accompanied and followed the decline and fall of the Roman Empire, —the engrossing nature of the religion and superstitions of the dark ages,—the exclusive attention bestowed on the writings of the ancients at the revival of letters,—and the higher claims of higher studies when civility and wealth had begun to diffuse a taste for original compositions, and gave encouragement and leisure to men of science and letters,—were all obliterative of a pursuit which was solely ornamental, and had no attraction except to those chosen few who found in the contemplation of Nature's works their principal gratification. That this number was not inconsiderable is certain, for otherwise it seems impossible to account for the publication of the voluminous and expensively illustrated books on natural history, which issued from the press within, or shortly after, the first century after the discovery of printing. And indeed the monastic system, and its

institutions, must have been favourable to the growth of such feelings, giving the necessary leisure and seclusion, while nature, presenting daily her works and phenomena, and her seasonal changes to these recluses, dull but not dead to their influence, insensibly operated and gave direction to the employment of their minds. It may be that these earliest works were not devoted even in part to conchology, but Natural History as one never advances without advantage to every department, and even this minor branch had soon its due share of love and notice. The vast volumes of Albertus Magnus,* Rondeletius,† Gesner‡ and Aldrovandus§ contain each of them books devoted to it, and although the original facts they disclose are very few in proportion to the mass heaped up in their folios, yet the criticism they have often received as the receptacles of lumber rather than museums of well-arranged records, seems to be unnecessarily harsh and severe. The study of the ancients, and the elucidation of their difficulties, was still a favourite object with men of literature, and when these early naturalists betook themselves to the writings which had come down to them rather than to the observation of things themselves, they but followed the bent of their compeers, and consulted the taste of their age. Their works are laborious compilations, in which every thing, however remotely connected with the subject in hand, good or bad, true or false,—whether recorded by grave philosopher, or sung or feigned by poet or traveller,—finds a place without any nicety as to its probableness, or conformity to the organization of the animals. On the contrary, there is evidently a strong predilection in their worthy authors to retail and believe every tale of instinct or use which might raise the object, however low and loathly, in our estimation,—a greater love of the marvels of Pliny than of the sobrieties of Aristotle. Still with all their faults, the reader will find them not void of novelty, either in philosophical remark or in the record of new creatures; and the plan adopted by them of giving figures of the species was a most important step towards facilitating the progress of the science. To look for any thing that deserves the name of System in their works appears next to absurd: they evidently had not yet felt its want, and had no distinct idea of the necessity or utility of any beyond what gave a convenient heading to their chapters. What little they do give us of arrangement may be said to be literally borrowed from Aristotle.

The writings of this period afford good evidence of a growing and

* 1495. † 1554. ‡ 1558. § 1599.

considerably extended taste for the contemplation of Shells, which was kept alive and diffused by the activity of a daily enlarging commerce furnishing, to collectors and amateurs, numerous novelties of uncommon forms and beauty to gratify, and at the same time to stimulate their curiosity. Hence also the origin of museums, of which Aldrovandus is usually said to have set the example: and of these Shells made a large and favourite part from their beauty and variety, and from the ease with which they were procured and preserved. These museums soon became rather numerous in Italy and Germany, and although they were undoubtedly formed more for the gratification of the taste of their owners, than with any views towards science, and hence arranged in fantastic and picturesque designs, still it is from their institution that we date the origin of Conchology as a separate branch of natural history. The catalogues published of a few of the most considerable of these museums are among the works generally enumerated as worthy of quotation in the history of Conchology, and it was the love of making collections of shells separately, that evidently gave origin to the works of Bonanni and Lister, the first which treated exclusively of these natural objects.

Bonanni's work was published in the year 1681, and from its title—"Recreatio Mentis et Oculi in observatione Animalium testaceorum"—was probably intended to be a book of luxury, exhibiting in its plates whatever amongst shells might please the eye or relocate the unoccupied mind. It is properly speaking, however, an introduction to Conchology, and in this view of it, the volume becomes interesting, since it affords the means by which the extent of the knowledge of Conchology at that period may be estimated. Of the writings of his immediate predecessors he speaks very slightingly: they remind him, he says, by their boastings when these are compared with their deeds, of those birds which floating aloft in the heavens draw notice by the amplitude of their spread of wing and the fulness of their plumage, but captured and plucked, the exility of their corpse proves to the sportsman how much he had been deceived! The treatise is divided into four parts: in the *first*, he proves, to his own satisfaction, that the study of shells is not a puerile but a wise and profitable occupation; investigates the mode of generation both of living and fossilized species; declares the fit materials from which they are formed, and takes occasion to talk learnedly of water, earths, nitre and petrifying humours; he descants on their colours, forms, and properties by which the Creator renders them visible to the privileged minds of philosophers; and lastly, enumerates their other uses to man, and what relates to them

as precious ornaments for museums, of the more remarkable of which we have a particular account in his 12th chapter. In the *second* part Bonanni describes each shell separately, noticing their parts, form, colours, names, and the seas which they inhabit.—In the *third* part he propounds about 40 problems or hard questions, annexing reasons or "an argument" to the dark and doubtful, by which a ray of truth may be thrown on them, and they may be made visible at least to the mental eye; he shews that pearls cannot be formed from dew, as Pliny would persuade us, that they are not the young but a disease of conchs; he explains why a shell applied to the ear seems, by its murmurings, to lament its native sea; inquires into the causes of shells being more abundant in the sea than on the land, and especially in the Indian Ocean, where they are also more beautifully pictured; why they are principally coloured on the exterior; wherefore they grow hard, seeing they are formed out of soft water; why they are twisted into many spires; why their snails have scarcely any diversity of members; why they are destitute of teeth, a heart, and bones; why nature denies them bile, and a liver and a spleen; why they grow lean on the wane of the moon; why they are slow and stoltish; why the juice of the Pholas is luminous at night; why among their various colours the cerulean is not to be found; and other such problems hitherto unargued or propounded,—not omitting to inquire learnedly whether the Remora, that stayed the ship sent from Periander on a cruel voyage to the Cape of Gnidos, was actually the shell called in consequence the Venus-shell, and "in regard whereof, the inhabitants of Gnidos doe honour and consecrate the said Porcellane within their temple of Venus."—The *fourth* and last part is occupied with the plates and figures described in the second, distributed into three classes, viz. the univalves not turbinate, the bivalves, and the turbinate univalves.

This slight outline of Bonanni's book is all our space will permit us to give, and is perhaps sufficient to enable the reader to appreciate its value, and the character of the writer. He was a Jesuit, with attainments and natural talents which, though respectable, certainly do not raise him above the level of his age,—perhaps he was under it,—better acquainted with the writings of his predecessors than of his contemporaries,—with the tastes of a virtuoso rather than of the man of science, skilful in all the vain logomachies of the schoolmen, and willing to give a ready assent to every thing which had ancient authority in its favour, but jealous and distrustful of all that was novel, and of every discovery that would carry knowledge forward. Hence we find his anatomy of shell-fish in-

ferior to that of Aristotle's, and his arrangement of them the same; hence his advocacy of the doctrine of spontaneous generation, when his contemporary Redi had demonstrated its absurdity; hence his exclusive attention to the form and colour of shells to his total oversight of conchology as a branch of general physiology; hence also his fondness in propounding, his copiousness in solving occult questions which, if resolved, were of no utility, but which were really beyond the province of human inquiry; hence the discussion wherefore shellfish were defective in this and that organ, without the slightest effort to ascertain whether that deficiency was a fact; and hence, in short, the reason that his volume contains not a single fact additional to the stock of knowledge in his own province, for we do not find that he has "treated of the formation of shells in a manner more philosophical than could have been expected at such a period," as Maton and Rackett have asserted. But we have no wish to depreciate Bonanni, who, as we have already mentioned, was a man of learning and repute, and it is not discreditable to an author that he is affirmed not to have anticipated his age: we have drawn his character as we think fairly, and it is a fair representation too, of the bulk of conchologists of his time, who obviously had little other object in the study than to indulge their love of virtuosoship.

Philippo Bonanni and Dr Martin Lister were co-equals in the date of the publication of their works,* but in character they were men of remote eras. Lister was not less learned than the Jesuit, but of that he made no parade, and if he had drunk of the logic of the schoolmen, his tutored mind had seen its folly, for we never find him indulging in disquisitions about things inscrutable or useless. Full of the medical knowledge of the day, Lister betook himself, following the bent of his genius, to a patient anatomy of the animals which tenant and construct the shells that had won his admiration, and, allowing for the state of anatomy then, we do not hesitate to say that his *Exercitationes* deserve to rank beside those of Poli and Cuvier. They are replete with accurate descriptions, not unmixed it is true with error, and some things he had overlooked and mistaken, but to mark these as blots on his diligence or reputation were uncandid and unfair to him who leaves the olden ways and deviates into a new country, in which he has to open up the roads. In every page Lister proves himself a laborious and observant anatomist and naturalist; while his disquisitions and digressions relative to the leaning of his discoveries on the physiolo-

* Lister's works were published between the years 1669 and 1697.

gical questions which divided the then medical world afford the fullest proof of his acuteness, judgment, and extensive learning.* His works deserve the attentive perusal of every student in conchology, who will not fail to reap advantage from the task, even though he should go to it acquainted with the subject from recent authorities.

Lister was a true naturalist, and the first conchologist of decided eminence. His anatomical works show how clearly he understood that the structure of the animals was the main object of our study,—its only sure foundation, and its best claim on our attention,—but he was also very observant of the habits, instincts, and peculiarities of snail and shell, and was at the same time zealous to acquire an extensive and accurate knowledge of species, to which end he sacrificed much. At his own cost, and with the labour of years, he completed and published a volume of plates, which is the pride of collectors, and is prized to this day for its utility. "His figures," Dr Maton and the Rev. Mr Rackett tell us, "both in point of number and faithfulness, are with reason still held in such high estimation, that no person attached to this branch of natural history can advance in it without the constant use of them, nor without finding them preferable for reference to many more splendid engravings which have succeeded them."†—"This admirable volume," says Dr Turton, "contains one thousand and fifty-five plates, besides twenty-one of anatomical figures, all drawn from original specimens by his two daughters, Susanna and Anna. Considering the state of natural science at the time this work was first issued, one hundred and thirty-three years since, it is impossible to contemplate this stupendous effort of genius and industry, without admiration at the grandeur of the design, and the correctness of its execution."‡

It was Lister's intention, after the publication of this volume of plates, to have proceeded with an anatomical description of every family or genus in its proper order, if God should grant him life and leisure, but from adverse health he was not permitted to do more than to anatomize the terrestrial slugs and snails, some freshwater Turbines, one or two of the marine Buccina, and a part of the Bivalves. The design was worthy of the man, and is a fine example of unwearied assiduity, which nought but a genuine enthusiasm

* His opinions relative to the functions of the liver in Mollusca appear deserving of more attention than they have yet received. See the Exer. Anat. de Cochleis, p. 79, &c.

† Lin. Trans. vii. p. 138.

‡ Conchological Dictionary, Introd. p. xvi.

could have kept alive. If perchance, says he, a stranger should be told that this man had devoted his years to the dissection of animalcules and snails, it might provoke his contempt or laughter, unless, indeed, the dissector was another Harvey, Malpighi, or a Redi; but I do not vehemently yearn for the applause of any one, having had my reward, for these exercises which were my pleasure and delight in youth, now that I am old they are my solace. And now when I am, from a failure of sight, compelled to use the microscope, and find that by its aid I can again enjoy myself in those studies, which have been long denied to the unassisted eye, I rejoice greatly.* We do love to dwell on the character of this man. Learned in his profession, and attaining its highest honours,—for he was physician to Queen Anne,—we now see him refocating his jaded spirits in the contemplation of his collections of shells, and enjoying, with a rapture which minds framed like his only feel, all their beauties and symmetries and singularities;—again we see him examining with a fatherly pride and pleasure the drawings which his daughters, who stand beside him, had laboured to finish before the duties of the day permitted their beloved parent to retire to his ease and study,—and at a more leisured season we see him, bent somewhat with age and infirmities,† anatomizing with the zeal and skill of his youth the creatures which he loved so well to study, now his keen eye kindling as the thought crosses him, that in this structure there was a ray which shed light on some obscurity in his own frame, —now lost in wonder at some display of a mechanism which can have but one author, while involuntarily he breathes the hymn,— "Oh altitudo! In his tam parvis, atque tam nullis, quæ ratio? quanta vis! quam inextricabilis perfectio!"

Lister then greatly advanced conchology by rescuing it from the charge of frivolity, by an unrivalled series of illustrations of species, by many novel remarks on their habits, by a very complete history of the species of his native land, and chiefly by giving us some excellent essays on the structure and physiology of the Mollusca which had been neglected since the time of Aristotle, for the isolated notices of a few species by Willis, Redi, Harderus, and Swammerdam, however good, had no influence on conchology, while those of Lister are epochal. He was fully aware too of the importance of system in this study, but he had not critically examined its real objects and use, and his classification, though elaborate, claims no praise of superiority. The *habitat* affords the character for his pri-

* Exercit. Anat. des Cochleis, p. 2.

† See the Preface to the App. Hist. Anim. Ang.

mary divisions or books,—hence shells are divided into the land, fresh-water, marine bivalve, and marine univalve classes; and the mode in which these are subdivided more resembles the synoptical tables which the French botanists now frequently prefix to their floras, constructed without any regard to the affinities of the objects they approximate, and solely intended to hunt down a species, than what is usually understood by a system in natural history.

So far as we remember (for his works are not all of them by us, and years have elapsed since their perusal,) the manner in which the shell is formed, and its relation to the snail, occupied no part of Lister's investigations, but previous to his decease the true solution of the problem was discovered by the illustrious Reaumur.* No experimental inquiry had hitherto been made on the subject, and the remarks in reference to it in conchological writers were scattered, vague, and hypothetical; while the opinion of better informed physiologists appears to have been that the shells were organized parts of the animal, which grew and increased with the latter by receiving nutriment and material from the body; that there was in fact nothing peculiar in the formation of shell, but that its growth depended, like the growth of other parts, on the circulation of juices within itself, and on the assimilation and addition of new matter. Reaumur was never content with reasoning on a point which experiment alone could solve, and with his usual ability and success he instituted numerous experiments on the subject under review. They were principally made on land snails (Helix,) but not restricted to them, for by confining fluviatile and marine species, both univalve and bivalve, in baskets framed so as to admit the water, and at the same time prevent the escape of the creatures, he was enabled to show that his theory was applicable to the whole class. He proved in this manner that the shell was enlarged by the deposition of calcareous matter to the edges of the aperture, and that this deposition was made in successive layers; that there was no increase from the intusception of calcareous matter, no additional increase from any action in the shell itself, but that the whole was a successive transudation from certain parts of the living tenant, to which the shell was an inorganic covering. It was objected to him that snails just issued from the egg had as many whorls as the parent, but the falsity of this observation was to Reaumur of easy proof, who found that these young had only one,

* "De la Formation et de l'accroissement des Coquilles des Animanx tant terrestres qu' aquatiques, soit de mer soit de riviere," in Mem. de l'Acad. Roy. des Sc. 1709.

or not more than a whorl and a-half; and his theory, divested of the mechanical phraseology in which some of its details are explained, remains essentially correct. Besides the establishing of this discovery so important in scientific conchology, Reaumur enriched it with much curious and interesting matter. His inquiry into the mechanism by which the limpets fix themselves so firmly, and the byssiferous bivalves spin their silken cables; his accurate description of the structure of the shell of the Pinna; and his experimental essay on the purple dye of the Buccinum, suggested to him by the excellent paper on the same subject by Mr Cole of Bristol, are favourable specimens of his talent for observation, and real additions to the stock of our knowledge, while they captivate us by the elegant and copious style in which they are written, and by the clearness of their details.

These labours and discoveries, and the high character of their authors, render the conclusion of the 16th, and the beginning of the 17th century, unquestionably the most interesting period in the history of conchology. Ray, who discovered the peculiar hermaphroditism of the snail, was the intimate friend of Lister,—Petiver and Sloane, celebrated for their museums, had entered the field ere he retired,—Balfour and Sibbald in Scotland were his contemporaries, and the latter his correspondent,—Poupart and Mery, two French anatomists of deserved celebrity, carried their researches in the same direction,—and Swammerdam, Leewenhoeck, and Rumphius* in Holland,—all these men were each in their way advancing conchology with a rapidity hitherto unexampled and not yet surpassed. We are apt, dazzled by this galaxy, to fix our attention too exclusively on the anatomical and physiological branches of the science, but let us not forget to note the benefit it received by the zeal of collectors, who were now importing species in great numbers from every quarter of the globe, and congregating them in museums which became celebrated throughout Europe for their richness. In England those of Petiver and Sloane surpassed all others; the collection of Sir Andrew Balfour of the University of Edinburgh was considerable;† but it was in Holland that the passion of forming

* Or rather Scheinvoet, a Dutch physician, who was the real author of Rumphius' Thesaurus. See D'Argenville's Conchyliog. p. 27.

† Sibbald's *Auctarium Musæi Balfouriani* "does not treat of *Testacea* exclusively, but comprehends a variety of subjects, which were contained in the collection of Sir Andrew Balfour, Knight, M. D.—a collection presented to the University of Edinburgh, and considerably augmented by the intimate friend of the donor, who described the whole in the work above-mentioned. Unfortu-

cabinets of shells became most prevalent. "Rich individuals studied to outvie one another in that country, as much in the expensiveness and extent of their collections, as in the splendour of their equipages and retinue; and the sums which were given for a *Cedonulli* or a *Wentletrap*, would appear too enormous to deserve belief, if such accounts were not authenticated by the most respectable writers of that day. Rumphius himself informs us in his preface to the 'Amboinshe Rariteitkamer,' that a shell described in this work cost no less than 500 Dutch florins."* In all this, of course, there was much less the love of science than the mere indulgence of a peculiar taste or rivalry that wealth or a natural disposition had engendered; and it is not easy to determine whether the good which it cannot be denied conchology derived from this zeal of collectors, was not overbalanced by the character of virtuosism it was calculated to fix on all its cultivators, and the new direction which it unquestionably gave to their studies. † It was to this zeal that we owe several expensive books of plates which were now prepared for the press, and published under the auspices usually of some

nately for the reputation of this University among naturalists, a very small part of the collection is now remaining. 'Such,' says Mr Pennant, 'has been the negligence of past times, that *scarce a specimen* of the noble collection deposited in it by Sir Andrew Balfour is to be met with, any more than the great additions made to it by Sir Robert Sibbald.'—(Scotch Tour, 1766, p. 246.) Such is too often the fate of public collections; and so slight or so transient is any respect for the laudable intentions of generous individuals towards public bodies, that common care is rarely taken to preserve from destruction what escapes the hand of peculation and robbery."—Lin. Trans. vii. p. 144.

* Lin. Trans. vii. p. 150.—"In 1753, at the sale of Commodore Lisle's shells at Langford's, four Wentletraps were sold for L. 75, 12s." Da Costa's Elem. of Conchology, p. 204.—"A specimen of *Conus cedonulli* has been valued at 300 guineas." Dillwyn's Catalogue, p. 376.—"*Ammiralium* varietates nitidas, *Turbinis scalaris* et *Ostreæ Mallei* æmulas nobilitavit docta ignorantia, pretiavit quam patiuntur opes stultitia, emtitavit barbara luxuria."—Lin. Syst. 1167.

† They did not of course escape the observation and the lash of the satirist.

> "But what in oddness can be more sublime
> Than *Sloane*, the foremost toyman of his time?
> His nice ambition lies in curious fancies,
> His daughter's portion a rich *Shell* inhances,
> And Ashmole's baby-house is, in his view,
> Britannia's golden mine, a rich Peru!"—YOUNG.

It is almost needless to remind the reader of the amusing papers in ridicule of the collectors in the 'Spectator' and 'Rambler,' but the irony of the latter in his No. 82, is more than compensated by his defence of these 'much injured' men in his Nos. 84 and 85.

wealthy amateur, and which, though too often occupying a prominent place in the history of conchology, have little merit excepting what they derive from the draughtsman and engraver. Hence also the repeated attempts on the part of the more studious to arrange the objects in quest after some novel or more convenient system, for without a regular specification of their contents it was evident no correct idea could be imparted of the extent and worth of the collection.

In indicating the progress of 'Method,' however, it is necessary to go back a little. We have seen that Aristotle had three orders of Testacea,—Univalves, Bivalves and the Turbinated,—but the class itself and these divisions were loosely defined; and the same vagueness is to be found in the writings of those authors who followed his method. Perhaps Dr Walter Charleton, Physician in Ordinary to Charles II. was the first who had a full conviction of the importance of system, but his attempt to arrange the Mollusca is very faulty.* The Limaces he places with apodous insects; and aquatic animals being divided as usual into the sanguineous and exsanguineous, the remaining molluscans are arranged under two classes—viz. the *mollia* or *molluscula* and the *testacea*. The first embraces all the cuttles and the Lepus marinus or Aplysia; the second the shelled tribes whose primary sections are the same as those of Aristotle's, while his genera, in general without definitions, rest on characters of little or no value. Jean-Daniel Major, Professor of Practical Medicine in the University of Keil, in the dutchy of Holstein, was the next to make the attempt, (1675,) which is pronounced by two critics, to whose opinion much deference has been shown, to be "infinitely too complicated and ramifying to admit of any useful application." Sibbald, Grew, Bonanni, Lister, Langius, Hebenstreit, Tournefort, D'Argenville, and Klein are perhaps the principal who followed in their wake, but it is evident that they had all entered on their task without a previous study of what the real object and use of method was, what principles were to guide them in framing the various sections, or what the relative bearing of these divisions on one another should be. The division of shells primarily into Multivalve, Bivalve, and Univalve had perhaps superseded the Aristotelian, and many new divisions of secondary rate were of course invented, but they were arbitrary, founded on no common principle, either too lax or too complex to be applicable in practice, cumbersome to the memory, and clumsy in writing. To analyse

* Onomastikon Zoikon. Lond. 1671. 4to.

these methods would be wearisome and unprofitable,—they were next to useless when promulgated, and have now no attraction even in the eyes of the pure conchologist. It is when we rise from their examination that we are in the best mood to appreciate the merits of Linnæus, and feel inclined to nod in complacent assentation to all the pæans which have been so often sung to his praise.

Linnæus having, with a tact characteristic of his genius for system, divided invertebrated animals into two great classes—*Insecta* and *Vermes*,—was less happy in his reduction of the latter into their secondary groups or orders. The testaceous mollusca occupy one order by themselves, in which there are four sections of equal value—the multivalve, bivalve *(Conchæ,)* the univalves with a regular spire *(Cochleæ)*, and the univalves without a regular spire.* In each section there are several genera defined with neat precision,—the characters of the multivalves being derived from the position of the valves,—of the bivalves from the number and structure of the hinge-teeth, or, in the absence of these, from a part influencing the opening of the valves,—of the Cochleæ from the unilocular or multilocular shell, but in most from the formation of the aperture ; while in the last division the shape of the shell affords the means of discriminating them, excepting in Teredo, which is defined " T. intrusa ligno," in evident contrariety to his principles and his better custom. The naked tribes are placed in the order denominated " Mollusca," where they stand, in " admired disorder," with radiated zoophytes, annelidans, parasitical worms, and the Echinodermata, which latter, however, are better in this strange miscellany, than they were when they stood either amongst simple or multivalved shells.

In estimating the merits of this system it is not fair to look back from our present vantage ground, and magnify its defects by a comparison with modern classifications : we are in candour to place ourselves behind its author, and looking forward, say how far his efforts have been useful or quickening.† Standing thus we trust to offend none of his admirers when we admit that there is nothing in its principle of a novel character : the soft mollusca were previously recognized and better assorted by Charleton ; and every one of the sections, and, if

* The expounders of Linnæus' system do not adopt this last division,—why it is difficult to say. By disregarding it they have injured the naturalness of the method.

† The first edition of the ' Systema Naturæ' was published in 1735, but 1758 is properly the year which gave birth to his conchological system, when the 10th edition was published. It was perfected in 1766.

we mistake not, of the genera also, of the shelled tribes had been already recognized. It labours under the censure of having too small regard to the animal, a censure in some degree just, for assuredly more was known of these than the definitions of the "Systema" would lead us to suppose; and it had still less regard to the position of the groups in reference to their organical affinities. It often associates species of dissimilar habits; and species are found in almost every genus at variance with the character of this, and where consequently the student ought not to have sought for them. The superiority of it lies in its simplicity; in the regulated subordination of all its parts; in the admirable sagacity with which the families or genera are limited; in the assumption of more stable characters for these, and for the clear distinct manner in which they are applied; in the suitableness of its nomenclature; in the invention of trivial names which gave a facility in writing hitherto unknown, and was a welcome relief to the memory; in the conciseness of the specific characters and the skill with which those characters were chosen; in the regular indication of the stations which the species occupy on the globe; and in the beauty of the more extended descriptions, and the peculiar felicity of language in which the thoughts suggested by any remarkable structure in the species under review are conveyed to us. That merits of this kind should secure him something more than approbation was natural: there was much excellence in it which prejudice or jealousy only could not see, and which folly alone would have rejected; and while every collector and amateur found it easy to be understood, ready in practice, and neat in nomenclaturing their cabinets, their pursuit assumed the garb of science when they could tell the scorner that they were following the steps, and had the sanction, of a man whose genius has justly won him a place in the first rank of those whom succeeding ages continue to venerate for the good they have done in the promotion of useful knowledge.

While the eyes of almost all were turned to this northern luminary for light to guide them in their pursuit, or as an object by barking at which a few drew notice on their littleness, Jussieu of Paris, the admirer of Linnæus' genius and industry, and his correspondent, was explaining to his select but few disciples the principles of what has been commonly called the "Natural System." Jussieu's profound studies were confined to botany, but he had colleagues and contemporaries who attempted their application to conchology, and whose want of success is to be ascribed mainly to the meagerness of the anatomy of the mollusca then attained, to the few-

ness of the observations made on the living species, and in part also to the imperfection of the views of the authors. Daubenton, the colleague of Buffon, so early as 1743, insisted on a knowledge of the animal as necessary to form a natural classification of shells; and in 1756, Guettard, who was the personal friend of Jussieu, not only gave his sanction to this opinion, but shewed its practicability and excellence by defining, from the peculiarities of the animal and shell combined, a considerable number of the univalves, comprehending among these, in evident agreement with their relations, though contrary to general use, the slugs, the Aplysia, and the Bullæa. But the fullest attempt of this kind was made by Adanson, whose work on Senegal was published some years before Linnæus had given the last revision to his system. Impelled by an indomitable enthusiasm, Adanson visited Senegal, under many disadvantages, to examine and describe the natural productions of a tropical climate; and for this purpose he made very extensive collections in every department of nature, but of his great work the first volume only, containing the outline of his travels and his account of the shells, was ever given to the public. The character of this volume has risen with the progress of the science, and it is more valued by the conchologists of the present day than it was by the contemporaries of its author. He had some personal peculiarities—too visible in his writings—which could not fail to hurt his popularity: an austere temperament, which caused him to treat his fellow-labourers with contemptuous acerbity,—a mind that would neither bend to nor treat with respect the prejudices as he deemed them of his age,—an unflinching severity in criticising the writings of others, and a pertinacious tenacity of his own views,—while some barbarisms he attempted to introduce into the nomenclature of conchology repelled the naturalists of a too nice taste, and the very extent of his requirements from those who claimed to be naturalists operated against him, for it was not to be supposed that mere collectors or virtuosos were to enter on so difficult a path, or would be willing to allow themselves to be pushed aside as idlers, and put without the pale of the scientific circle. That very beauty, he exclaims, which by its variety has attracted the regards of men to shells has become an obstacle to their knowledge. "La coquille seule dépositaire de cette riche parure, a fait mépriser l'animal auquel elle servoit de couverture, et est devenue seule l'objet de l'admiration de quelques naturalistes. Epris, comme les curieux, de la beauté frappante de ses couleurs, ils n'ont pas jugé que l'habitant fût digne de leurs recherches, et le difficulté de se le procurer à chaque instant, n'a pas

peu contribué à augmenter leur dédain. Ils se sont donc bornés à l'examen des coquilles, ils n'en ont considéré que le forme, celle de son ouverture, on le nombre de ses pieces ; c'est d'elle seule qu'ils ont voulu tirer leurs caracteres primitifs et distinctifs : de-là cette foule de systêmes aussi peu satisfaisans les uns que les autres."*

At a season when 'Systems' were all in vogue Adanson, with characteristic boldness, declared himself their enemy as being worse than useless, fit only to amuse triflers, certain to lead to error and alienate us from true views of the objects in question, and so easy of invention to boot that several equally good might be made by one of common experience and capacity. The history of conchology had already offered too many examples of the truth of this assertion, and he was not slack to give additional specimens in its illustration. But notwithstanding his philippick against them, Adanson, in some measure, forgot his own principles, and was little less of a systematist than those were whom he censured. Shell-fish were, according to him, distinguishable in the first place into "Limaçons" and "Conques ;" the former were subdivided into univalves and operculated univalves, and the Conques into bivalves and multivalves ; these primary families were still further divided into smaller groups from the position of the eyes in the Limaçons, and from the figure of the respiratory tubes in the Conques. Now it was a pure arbitrariness in him to fix upon the operculum as a part or organ of primary value, for there is nothing in its use or position to justify the choice, nor did he attempt, by any analysis, to show that it was a regulator of structure and habits ; and it was equally arbitrary to divide the bivalves into two sections on the mere existence of a few additional pieces over the hinge, for these pieces were not proved to be an index to the animal's economy. But Adanson's services to conchology are very great,—of those its labourers who have passed in review we place him next to Lister. He has the merit of having altogether removed from the Testacea the Lepas and Balani, whose structure he saw was modelled after the type of another category ; his interesting discovery of the Vermetus was a fine illustration of the shell being of itself useless as a character in natural history ; and his knowledge of affinities was made evident by the acuteness which lead him to approximate the Teredo to the Pholas. If not the first to point out the importance of the operculum, he was undoubtedly the first who knew its value as an index to natural relationship between genera ; perhaps the first who was fully aware that the entireness or canali-

* Hist. des Coquillages, pref. v.

culate formation of the aperture of the shell gave an insight into the habits of the snail in regard to food; the first too to point out fully the influence of age and sex in altering the shape of the shell, and more especially of its aperture; the first to describe and delineate the animal tenant of many genera; and although his attention was exclusively directed to external characters, yet we are above all indebted to him for his strong advocacy of the maxim that the anatomy of the animal was the sole sure foundation of a rational arrangement which had in view the mutual affinities of the objects it attempted to classify, and present them not fancifully commixed as they might be placed in a museum, but according to those characters which nature itself had given them of affinity or dissemblance. "There is then," he says, "in shell-fish something more to consider than their shells; the snail which tenants them ought to guide our methodical arrangements, to be our only regulator, since it is the principal part, that which gives to the exterior skeleton its form, size, hardness, colours, and all the other peculiarities in it which we admire. If we attentively examine this new and forgotten race, if we consider individually the members of it, we shall discover in their manners, in their actions, in their movements and manner of life, an infinitude of curious circumstances, of facts interesting and fitted to arrest the attention of every zealous and intelligent observer; we shall perceive in the organism of their bodies a great number of parts remarkable in their structure and use; and in entering into details we shall soon be compelled to grant that this study is no childish play, but as thorny and full of difficulties as any other in the wide range of natural history."*

The example of Adanson was followed by Geoffroy who, in a history of the shells found in the vicinity of Paris, attempted to arrange them on the external anatomy of their animals; and by Muller, who described in the same manner the mollusca of the north of Europe. The writings of Muller are still deservedly held in high estimation. They contain the descriptions of many novelties, and his descriptions of them, as well as of species previously known, are remarkable for their accuracy; they are thickly strewed with notices of the external anatomy and habits of those he had examined alive; and his style of writing is interesting, rising occasionally to eloquence. As an observer and teller of what he had observed, he claims a place among the first, but he was the discoverer of no fact in their structure or physiology of any consequence—we speak in reference to the mollusca only; and his systematic efforts were limited and partial, al-

* Lib. sup. cit. pref. x.

though he sometimes drops a hint on the subject, which makes us almost believe that he was capable of better things, had he had courage to have made the attempt. * In relation to the mollusca he clearly saw the impropriety of making the presence or absence of the shell an ordinal character; and he knew, vaguely it may be, the affinity between the bivalvular mollusca and the Tunicata. "For what"—we translate his words—"are the Testacea but mollusca furnished with a shell, and what are mollusca but Testacea destitute of it? There is the most exact agreement of the tenants of the univalve shells which are called Helices with the naked slugs; and an agreement not to be overlooked of bivalves with the Ascidia; and the very error of our predecessors, who said that slugs were merely snails which had crept out of their shells, proves their near affinity. Besides the insensible but evident transition of nature from the naked Limax to the testaceous—passing from the former, which at most has the mere rudiment of an internal shell to the latter by means of the Buccinum (Lymnæa) glutinosum, which conceals its membranous shell under a fleshy mantle, supports plainly our opinion. Therefore I do not doubt that a future age will join together the naked slugs and the shelled snails, which authors have separated into different orders." "If we wish," he writes in another place, "properly to know and discriminate natural objects, they must be considered in every point of view and in all states, so far as human imbecility will permit. The attainment of knowledge is thus indeed rendered more difficult, but at the same time more pleasant and accurate; genera indeed are multiplied, but by this way only, if by any, can species ever be determined. This is the alpha and omega of our labours, since systems and methods and genera are arbitrary and framed by the narrow limits of our knowledge. Nature acknowledges one division of created bodies only—the living and brute matter—spurning for the most part the arrangements of systematists into classes and orders, families and genera, and her productions are often so affined that their limits can never be strictly fixed. Characters derived from the interior and exterior structure of bodies deceive us not solely in the higher divisions; and even the manner of life and the mode of propagation do not afford any certain distinctions either in those races which are visible or in those which are invisible to the naked eye. There is therefore only one family, and one Father of all, who has marked with a constant character all species whatever from the Monad to the turret-

* His 'Method,' as detailed by himself, is as artificial as the Linnæan, and actually less in harmony with the animal organization.

bearing Elephant, and has distinguished Man alone with a reasonable soul." *

The celebrated Pallas was another who at this period had obtained a glimpse of the true relations of the mollusca as a class even clearer than Müller,† but he did not pursue the subject, and as his slight incidental notice, though it might have originated inquiry in a predisposed mind, was not otherwise of a nature to produce any effect, so the pains of Geoffroy and Müller were equally unproductive. The authority of Linnæus prevailed every where. The force of his genius having swept away all previous systems, there was no other safety for a naturalist, than to take refuge in the Linnæan ark, which floated on the surface proud amid the ruins,—the systems of his contemporaries also sinking one after another in the waters of forgetfulness. His disciples were distinguished by their enthusiasm in the pursuit of nature, and their love of their master; and the facility with which they found their discoveries were registered, and the easy nature of the discoveries which sufficed to give them a certain reputation, requiring nought but zeal, opportunity, and a knowledge of the 'Systema' not difficult to be acquired, rivetted their attachments. In England nothing was tolerated that was not according to the letter of Linnæus: his works were a code of laws which, like an act of Parliament, was to be interpreted verbally, and the spirit of them was unseen or overlooked. Under his reforming hand, Conchology having passed "from confusion and incongruity to lucid order and simplicity," the slightest attempt to alter this order was treated as an attempt to replunge us into the chaos, whence he had brought us, and further improvement or alteration was declared to be futile, since the "beauties" of the Linnæan "must perpetuate its pre-eminence." Were it shewn that, from the very subsidiary station the animal was made to occupy in this system, there was a fear attention should be drawn from the object most worthy of it, we were seriously told that the animal, even could it be procured, which was doubtful, would never present those "permanent and obvious points of distinction" indispensable in the application of a system meant to be practical. Wherein does the animal differ, it was asked in a tone of triumph, signifying that reply was impossible,—"wherein does the animal differ from an unshapen mass of lifeless matter when coiled up within its shelly habitation? And how are its natural shape and appendages to be examined, but by the knife of an anatomist?"‡ Were it proved, what indeed was most palpable, that species of opposite

* See the Præfatio to his Verm. Ter. et Fluv. Vol. i. 1773.

† Misc. Zool. p. 72, 73. Lug. Batav. 1778.

‡ Lin. Trans. vii. p. 177.

habits and habitations were huddled together under a common head, it was answered that to derive characters from such particulars was contrary to axiom and unphilosophical; and if it were demonstrative that the class of Testacea, as a whole, was constituted of heterogeneous disparates,—as for example when Pallas indicated the difference between this class and the Serpulæ,—what then? Nature gloried in variety and oppositions, and was herself systemless, * as if it were possible to believe that He who made every thing in wisdom and order had shook His creatures from His hand, with the same wanton unordered profusion that the poet has represented the jocund May, flinging the flowerets from her teeming lap. Such were the futile reasons by which this System was upheld, and so firm was its despotism that, until within these twenty years, there was little or no relaxation on its hold of public opinion; and its evil effects are too evident in the superficialness of the productions which emanated from this school.

Even in France the Linnæan system soon became little less predominant under the leading of Bruguiere, but the regard the French paid to it was of a less slavish character than it had assumed in Britain. Bruguiere, though a Linnæan in principle, carried forward in some degree the system of his master by intercalating several new and obviously necessary genera; and he was otherwise a conchologist of higher attainments than any England could at that period boast of. He cannot be said to have promoted conchology in any very sensible degree, but he made no effort to arrest it, or detain the science at the stage where Linnæus had left it. Nor indeed is it perhaps possible to stop the march of any, however trivial the branch of science, to perfection. Like the operations of Nature in her living productions ever tending to maturity, there are periods of acceleration and delay, and causes may for a season induce a sickly weakness that waits long for a remedy, but come at last this will. Conchology was now in her sickly time,—nevertheless in a state of constant advancement. Ellis, Baster, Bohadtch, Pallas, Muller, Forskal, Solander, and Otho Fabricius, all of whom might have seen Linnæus in the flesh, and were his immediate successors, drew attention to the naked molluscans in particu-

* "Nature does not seem to have observed *any system*, and an artificial one will ever be attended with anomalies. Whatever method therefore most readily leads to the subject under investigation, is certainly the best, and in this case it is of small importance where that subject is placed, or how far it is removed from others to which it seems to bear a general resemblance."—Maton in Pulteney's Life of Linnæus, p. 238.—Sir J. E. Smith also allows himself to talk of the "irregularities of Nature," as an apology for some inconsistencies in the zoological works of Linnæus.—Tracts, p. 136.

lar whose curious variety was enticing and provocative to further quest; Herissant, Scopoli, Bruguiere, and Olivi, described many species with their animals, and entered too into physiological questions which it was worthy reasonable men to solve; Knorr, Davila, Martini and Chemnitz, Schröter, Born, Pennant, Da Costa, and Martyn, set forth at intervals volumes of figures more numerous in species and more correct than had been hitherto attempted; and the minute or microscopic species, which notwithstanding their littleness have played a most important part in the revolutions of our globe, were well illustrated in the works of Soldani, Plancus, Boys and Walker, and of Fichtel and Moll. Yet this array of names only proves a wider spread of the study,—the students may have been, and we think were, mediocrists,—many of them were simply ichniographists and collectors.* We can remember no discovery by which to distinguish the period, for the developement or improvement of an artificial system, the accumulation of species, and their more accurate discrimination, though points of considerable importance, are not sufficiently so to mark an era. Perhaps the most curious and interesting discovery that was made in it is that of the capability of the snail to reproduce its tentacula, eyes, and head, when these have been cut off, —the phenomena of which singular reintegration were amply elucidated by the experiments of Spallanzani, Bonnet, and others.

The first to raise us from this enchained slumber was Cuvier. Before this great naturalist entered the field, Poli, a Neapolitan physician, had indeed anatomized with admirable skill the bivalved mollusca of his native shores, and had constructed a new arrangement of them from the characters of the animal alone, but partly from the political position of Europe, partly from the very expensive fashion in which Poli's work was published, and its consequent extremely limited circulation, and in part also from the partial application of his system and its didactick character, the erroneousness of his general views, and the novelty of his nomenclature,—we cannot trace its influence either as diffusive or propulsive of conchology. The result

* It is most especially necessary to except from this remark John Hunter, but his labours and views were not published, and were not appreciated. "John Hunter was a great discoverer in his own science; but one who well knew him has told us, that few of his contemporaries perceived the ultimate object of his pursuits; and his strong and solitary genius laboured to perfect his designs without the solace of sympathy, without one cheering approbation."—D'Israeli's Literary Character, Vol. i. p. 146. See Abernethy's Physiological Lectures, p. 193, for a list of the Mollusca anatomized and exhibited in Hunter's Museum; also p. 217, 263.

of Cuvier's labours was happily very different. In 1788, when he was scarcely nineteen years of age, circumstances fixed Cuvier for a time at Caen in Normandy. His sojourn on the borders of the sea induced him, already an enthusiast in natural history, to study marine animals, more especially the mollusca, and the anatomies of them which he now made conducted him to the developement of his great views on the whole of the animal kingdom. With unwearied zeal he collected the materials which were at no distant date to become the basis of a classification which run through all its details in a harmonious parallelism with the developement of organization, so that the student of it when in search of the name and place of the object in his hand was necessitated simultaneously to acquire a knowledge of its principal structural peculiarities, on which, again, as Cuvier beautifully explained, all its habits in relation to food, to habitation, and to locomotion were made dependant. The Linnæan system of avertebrated animals, even in its primary sections, rested on a single external character. The Insecta were *antennulated*, and the Vermes were *tentaculated* avertebrates. Had the character been constant or even general, it might have had some claim for adoption, but to a want of constancy was added the fundamental defect of its inappreciable influence over the organisms of the body. Cuvier's object being to give us not merely a key to the name, but to make that key open at the same time a knowledge of the structure and relations of the creature, such arbitrary assumption of a character was to him useless. After innumerable dissections had made him familiar with many structures, and after a careful consideration of the respective value of characters, as shown in their constancy and influence on the economy of the species, Cuvier resolved to divide the animal kingdom, not as hitherto into two, but into four principal sub-kingdoms, drawing their lines of separation from differences exhibited in the plan on which their muscular, their nervous, and their circulating systems were formed. "There exist in nature," he says, "*four* principal forms, or general plans, according to which all animals seem to have been modelled, and the ulterior divisions of which, whatever name the naturalist may apply to them, are but comparatively slight modifications, founded on developement or addition of certain parts, which do not change the essence of the plan." Of these forms the mollusca furnish the second, of which the essential character is derived from the peculiar arrangement of the nervous system, consisting of some ganglions scattered as it were irregularly through the body, and from each of which nerves radiate to its various organs. As there is no skeleton, so the muscles are attached to the skin,

which forms a soft contractile envelope protected, in many species by a shell. The greater number possess the senses of taste and sight, but the last is often wanting. "Only one family can boast of the organ of hearing; they have always a complete system of circulation, and organs peculiarly adapted to respiration; those of digestion and secretion are nearly as complicated as the same organs in vertebrated animals."* The sub-kingdom, characterized and limited by those important features, is next divided into six classes, the characters of which are mostly derived from the organs of locomotion, or others not less influential. Thus the Cephalopodes bear their feet and arms like a coronet round the summit of the head; the Pteropodes swim in their native seas by fin-like oars; and the Gasteropodes crawl on the belly by means of a flat disk or sole. Reaching now tribes among whom the organs of motion are less developed, and accordingly less influential on their manners, Cuvier resorts to others. Thus the fourth class is named Acéphales, because it is strikingly distinguished by the want of head and amorphous form of its constituents; the Brachiopodes are equally acephalous, but near the mouth they have two fringed fleshy organs which simulate feet; and the Cirropodes have several pairs of subarticulated fringed feet, in addition to a multivalved shell of a peculiar construction. The orders of these classes, when the class admits of further subdivision, rest upon distinct differences in the structure and position of the branchiæ or respiratory organs; and when we reflect a moment on the paramount necessity of these to the animal, and their necessary co-adaptation to its locality and wants, it is scarcely possible to conceive that a happier choice could have been made.

It were unsuitable to our purpose to explain at greater length the Cuvierian system. Enough has been said to show its vast superiority to all that had preceded it; and the solidity of its basis is proved by the fact that the numerous recent discoveries in this department have not shaken it, or altered its principles. The lower divisions and sections have been improved and increased, the definitions have been rendered more technical and precise, but every method which has followed, both in its outline and main features, are merely modifications, and very slight ones, of Cuvier's. He always regarded his labours in this field with peculiar satisfaction, and watched their offspring with some degree of jealousy, unwilling that the parentage should be either doubtful or divided. "It is well known," he says, "how much care and time I have devoted to the anatomy of the mollusca in general,

* Memoirs of Cuvier by Mrs Lee, p. 107–9.

and in particular to the knowledge of the naked mollusca. The determination of the class, its principal divisions and subdivisions, all repose upon my own observations, for the magnificent work of M. Poli aided me no further than by some descriptions, and some anatomies useful to my end, and these were confined to the multivalves and bivalves. I have verified all the facts which that able anatomist has furnished me, and, as I think, have determined with more accuracy the functions of some organs. I have also sought to characterize the animals to which the principal forms of shells belong, and to classify these in accordance with the organization of their inhabitants, leaving the ulterior divisions of them into genera and subgenera, to those who devote themselves in particular to this kind of work." *

Did not our pages, on which we have already too much transgressed with this subject, forbid the attempt, we would gladly go on to trace the effects of Cuvier's example and views. It must suffice to say, that they raised the character of the conchologist, and gave a more philosophical tone to his pursuit; they originated a new school, with better directed zeal, and a higher aim, and numbers became disciples when they saw that here as much satisfaction and profit was to be reaped as in the study of almost any other class, for it may be laid down as an axiom that no branch of natural history, however apparently trifling, "but may be ennobled by the manner in which it is pursued; and when the student carries all its wonders back to the one Great Source, the smallest worm and the most beautiful of his own species will afford him subjects for the deepest contemplation." For some years Cuvier's system, even in France, divided the favour of naturalists with the more artfully constructed one of Lamarck, remarkable for the precision and neatness of all its details, and its better adaptation to the purposes of the mere nomenclaturist; and in Britain we knew little of Cuvier, until the peace of 1816 had restored a friendly correspondence between the men of science of Europe, and it was some years later still until his merits as a naturalist were appreciated, and his system began to weaken and dissolve our Linnæan prejudices. To indicate the modifications which this system has been made to undergo in the hands of Lamarck, Gray, Blainville, Oken, Latreille, &c. is here impossible;—the same with the improvements proposed on the arrangement of the Cephalopodes and Brachiopodes by Owen, of the Pteropodes by Sander Rang, of the pulmoniferous Gasteropodes by De Ferrusac, of the Bivalves by Deshayes, and of the shelless Acephales by Savigny. We must pass over in the same silence the

* Regne Animal, i. Pref. p. xxvi.

anatomical and physiological discoveries which so remarkably distinguish the few last years, and have given that fulness and perfection to the knowledge of molluscans which Linnæans were never weary of telling us was unattainable. Berkeley, Blainville, Bojanus, Carus, Chamisso, Deshayes, D'Orbigny, Dumas, Grant, Gray, Jacobson, Milne-Edwards, Muller, Owen, Lund, Sander Rang, Roux, Savigny, Sharpey, Unger, Vanbeneden, Armand de Quatrefages, Prevost,—to these naturalists our homage is justly due for their labours in this field, which, however, we should remember, was comparatively barren, until Cuvier made evident its natural productiveness, and taught us to plough deeper in the soil.

Such is a very hurried sketch of the history of a department of the animal kingdom, to which we confess our partiality, and to which the works placed at the head of this article are intended to introduce us. None of them come up to our ideas of what an 'Introduction' ought to be, and in none of them will the student find a compendious view of the actual state of conchology in reference to the anatomy, physiology, economy, and systematic classification of its members. Blainville's Manuel, indeed, is the only one which makes this pretence, and had it been complete (which it was not) at the date of its publication, subsequent discovery would now have rendered it defective. It is, however, even in its plan and design discommendable as an introductory work. The division of it into two books, one appropriated to the animals, and the other to the shells, seems to us unfortunate, as tending to divide what ought ever to be studied in close connection; and his plan of describing the anatomy of the organs in distinct and widely apart chapters, from the functions of them, is liable to the same objection. His chapters considered separately are dry and sketchy,—no spirit in his style, nor vigour in his delineations, no wandering into pleasant digressions, no indulgence in higher and aberrant contemplations, when the wonders of structure—its beauties and singularities open upon him in such a manner as might seem enough "to excitate the earthiest soul." Indeed Blainville has made his book rather an exposition of his own views, and of his own system, than an introduction to what was known and done by others; and as his system has not been adopted, nor his nomenclature approved, the value of the work is thus much lowered to a student. With these deductions, however, he will find in it much information not accessible otherwise in so compendious a form,—a manual he will not often read, but which he must frequently consult.

Sander Rang might, without a charge of immodesty, have inscribed on his title-page, the "parva sed apta" which Mr Swainson has,

with so little propriety and a good deal of vanity, adopted. This excellent volume is an exposition of Cuvier's system of molluscans, with such alterations and additions as recent discoveries seem to have rendered advisable and necessary. It contains a very ample character of the classes, orders, families, and genera, in which, as is becoming, the attention is principally directed to those exhibited by the living animal. He informs us that his materials were chiefly taken from the works of Adanson, Poli, Cuvier, and Blainville; but from his proper study, and during his travels as an officer of marines, he had been able to compare their descriptions, made in general on dead specimens, with the animal in life, and had hence been able to rectify some errors and add new characters. The "discours sommaire" contains a rapid but spirited and correct review of the exterior anatomy and principal internal viscera; and throughout we have scattered notices on the habits of numerous species of great interest. Some of these we would have willingly transferred to our review, had our space allowed; and this is the less necessary as the volume ought to be in the hands of every conchologist. It is, however, too systematic in its plan to be considered elementary, for those details of structure, function, and habits, which are not subservient to system, have been purposely excluded, while they must constitute the base of every introduction worthy of attention.

The "Genera" of Sowerby is just the opposite of Rang's. The latter is a very small and a very cheap volume, the former is a work of large extent and great expence; the one treats of living creatures, and in every page there is evidence of a warm enthusiasm in their study, the other concerns itself with the shell only, and the letter-press is sobered down to suit the gravity of science. Sowerby's book is in fact intended rather for the collector of a cabinet of shells, than for the student of living mollusca, and to the geologist it is perhaps indispensable. The genera are carefully defined, and the limits of each exactly pointed out, and illustrated by a series of admirable figures drawn from characteristic specimens. It is to be regretted that this work has been so long in course of publication, now we imagine some twelve or fourteen years,—for the incompleted state in which it is left detracts from its usefulness, and renders its consultation very irksome and inconvenient.

We refrain from giving an opinion of Mr Swainson's Elements, for humble critics are incompetent to estimate the worth of a pamphlet which the author avows was written because he excells in the knowledge of the subject, and because he had not met with any introduction which his children would not hereafter have to *unlearn!*

To this severity of censure his predecessors may naturally demur, and, perhaps, there is some ground for retaliation, but that is an affair between themselves with which we need not meddle. To our children, or readers, we cannot for our part recommend the boastful "Elements," because we would wish them to be something better than amateurs, and to know something more of conchology than the names of the things they collect. The work is written in evident obedience to the adage—"a great book is a great evil;"—and in 62 duodecimo pages we find an explanation of the few terms used in describing shells, a distribution of these after the quinary plan, not more successful than Oken's was when he arranged them after the sacred number of four, with definitions of all the genera simply and neatly done, but the characters derived exclusively from the shells; and lastly a chapter on collecting, preserving, and arranging these bodies, and a plan of study. We shall defer our exposition of Mr Swainson's system until the publication of "the Conchological volume of Dr Lardner's *Cabinet of Natural History* shortly to be published."

"It is easier to refute error than to establish truth:" quoth the Rev. Mr Burrow with sententious profoundness, "thus, the several writers who have dissented from the Linnæan school have, indeed, satisfactorily pointed out some flaws in the great fabric of the 'Systema Naturæ;' but in attempting to eradicate the faulty parts, and to supply their place more fitly, they have injured some of the main supports, and have nearly involved the whole edifice in ruin. (Very pretty!)—The following pages are devoted to the task of facilitating the study of conchology, on the method of the Swedish naturalist; and they are written under the firm persuasion, that a material change is dangerous even in speculative matters, when *the principle* has stood the test of general consent, and when the means of reaching perfection are not yet, or, perhaps, may never be, attainable."—Such is the *twaddle*—and there is much more of the same sort of stuff—with which Mr B. recommends his 'Elements,' containing, in this year A. D. 1836, nothing more than a dry unprofitable exposition of the Linnæan system, the spirit of which the author does not comprehend. Living remote from "public haunt," and consequently in ignorance of the progress of conchology among the metropolitan connoisseurs, we had concluded that the race of Linnæans had become extinct, but it seems we have erred in our haste, and that some of them are still in a living active state, for it were otherwise a sad prospect to his publisher were this reverend gentleman to be alone left like

"The late-blown rose
"Lingering after all the rest."

It is from a full conviction that such productions as the one before us lessen and degrade a favourite pursuit in the eyes of all rational men, and make it a laughing-stock to the satirical, that we feel called upon to protest upon their being received as evidence touching the nature of our studies. So we willingly consign this one to our highest shelf, where it shall remain to gather the dust that already covers, with a thick and undisturbed repose, the very similar volumes of Mr Brookes and Captain Brown, and the "exquisite Conchologist's Companion" of Miss Mary Roberts, who, however, sometimes enlivens her pages with a sort of quixotical sentimentalism and a blundering absurdity that provokes a smile;—and thus only doth she surpass her competitors.

Bibliographical Notices.

Fauna Japonica. Auctore Ph. Fr. De Siebold.—Ophidii elaborantibus C. J. Temminck et H. Schlegel. Fol. Lugduni Batav.

The Erpetologie of Japan has hitherto been sparingly illustrated. The present number of this interesting work, commencing the *Ophidii*, is therefore an important addition to our knowledge of the natural history of the Japanese empire. Former naturalists have borne testimony that that department of the Fauna was very circumscribed, and the present researches, in the words of Temminck and Schlegel, have produced "collections à la verité riches en individus, mais ou les espèces sont toujours bornées à un nombre tres-limité." The species here described are only ten in number: 3 species of Coluber, 2 of Tropidonatus, 1 Trigonocephalus, and 4 Hydrophis. The plates are lithographic and nicely executed, but uncoloured; hence all the generic characters, and the expression of the scaling are distinctly seen, while we have to regret the want of those vivid tints which generally adorn the exterior of these creatures.

A part of the introductory portion of the whole work is also given, which we shall notice more in detail at an early period.

A Synopsis of the Birds of Australia and the adjacent Islands. By John Gould, F. L. S. Part II. Royal 8vo. 1837.

The second number of this peculiarly managed work has just been forwarded to us. It equals its predecessor in the beauty of its finishing, and we have illustrations of the characters of forty species, comprised in the genera *Monarcha, Amadina, Pardalotus, Platycercus, Nanodes, Meliphaga, Acanthorhynchus,* (a genus formed from the

Meliphaga tenuriostris of Vig. and Horsf.;) *Coturnix*, *Hemipodius*, *Ægialitis*, (a name proposed by Vieillot for a family among the Grallatores, here used as a generic title for the form of Charadrius represented by the little ring-dotterel *Ch. hiaticula;*) *Himantopus*, of which the species described, *H. palmatus*, Gould, is extremely interesting, as exhibiting a complete palmation or web between the toes, and thus running into the avosets, *Recurvirostra*, *Oxyura*, and *Sterna*.

Catalogue of the Cellulares or Flowerless Plants of Great Britain, or those included in the Linnæan class Cryptogamia; compiled from Sir W. J. Hooker's English Flora, Vol. V.; Sir J. E. Smith's English Flora, Vol. IV.; Mackay's Flora Hibernica; Henslow's Catalogue of British Plants, and other sources. By W. A. Leighton, B. A., F. B. S. Ed. 8vo. London, Longman, 1837.

This sheet, as indicated by the title, is a mere catalogue, which has been deemed necessary on account of "the increased and increasing study of the Cryptogamic tribes." It is intended to facilitate the interchange of species, to afford a convenient index for the herbarium, and, if interleaved, to serve as a book for memoranda, regarding some of the rarer species. For the above purposes this catalogue cannot fail to be useful, and, being printed on a single large sheet, it can be transmitted by mail at the charge of a single postage, and afterwards cut and folded, as its possessor may find most convenient. The price of the sheet is sixpence.

A History of British Birds, Indigenous and Migratory, including their organization, habits, and relations, remarks on Classification and Nomenclature; an account of the principal organs of birds, and observations relative to practical Ornithology. Illustrated by numerous engravings. By William Macgillivray. Vol. I. 8vo. London, 1837.

The work bearing the above title is a thick octavo volume of 631 pages, having for its object "to lay before the public, descriptions of the birds of Great Britain, more extended and, if possible, more correct than any previously offered."* We do not wish to appear unnecessarily critical regarding the manner in which Mr Macgillivray has accomplished this object, but we should not act fairly to our subscribers were we to say that it is done successfully. The writing appears to us an affected attempt to imitate the styles of Isaac Walton and of Audubon, which, being extremely peculiar, can only be relished

* Preface.

in the originals,—and here, as in the case of similar imitations, we desiderate their freshness, and dislike the misplaced quaintness of expression. It appears trifling, while the meaning is by no means distinctly conveyed. The incidental remarks and digressions liberally dispersed through the volume, (often totally irrelevant to the subject, see p. 125,) are sometimes expressed scarcely with a kindly feeling, and seem to show an inclination to undervalue the opinions of others when a unison of ideas cannot be found.

This book is composed of two parts: The first, introductory; the second commences the history of the birds themselves belonging to four of the orders, which our author has thought necessary to form on principles of his own, and which are "doubtless excellent and admirable in the eyes of their inventor."

The introductory portion* contains, first, "remarks on classification and nomenclature," and "samples" of systems are given in outlines of those of Linnæus and Vieillot. Next follows an exposition of our author's own system. This is "primarily divided into four groups, sections, or sub-classes, determined by their mode of life," and they come in the place of the familiar divisions of "land and water birds."† They are, I. Aërial birds, Aves Aëriæ or Volitoriæ; II. Terrestrial, Aves Terrestres or Ambulatoriæ; III. Amphibious or wading, Aves Littorales or Grallatoriæ; IV. Aquatic birds, or Natatoriæ. These again are separated into no fewer than Nineteen Orders, each section containing four, except the second, in which seven have been placed. We cannot consider this system more simple or comprehensive than many of its predecessors, and we do not think the nomenclature improved by the introduction of sectional or generic titles, such as, *Volitatores*, *Deglubitores*, *Raptatores*, *Palpatores*, &c. or in another language, of *Plunderers*, *Cooers*, *Huskers*, *Gropers*, *Probers*, &c. &c.; but "methods spring up and die like mushrooms, and for the same reason; they are composed of flimsy and unsubstantial materials easily elaborated."‡

Of the concluding part of the introduction, "Remarks on the structure of birds," we have a higher opinion. It is a subject interesting from the little attention which has hitherto been given to it, particularly in this country, and from the great importance which the knowledge of structure is in our generalizations upon the functions of the different parts, and the economy and habits of the individuals. This part, though short, is well done. The anatomy is con-

* Introduction, p. 15. † Ibid, p. 16. ‡ Ibid, p. 19.

cisely detailed, without any of the affectedness of style which we dislike so much elsewhere, and it is illustrated by nine engravings well wrought from the pencil of the author, exhibiting views of the osteology, the muscular arrangement, and the digestive organs in the principal divisions.

The second part of the book, occupying 500 pages, is devoted to the history of four of the orders " Rasores, Scrapers. Gemitores, Cooers. Deglubibitores, Huskers. Vagatores, Wanderers." This description or historical part wants condensation; it is much too lengthened, without bringing together the information which is really of use to the student of British ornithology. It is illustrated by woodcuts of most of the parts which are essential in the system, as generic, many of which are well drawn and executed. We are treated also with " Practical Ornithology," in chapters 1, 2, 3 and 4, but these lessons we dislike *in toto*, both in substance and in spirit.

Report by MM. De Blainville, Isidore Geoffroy, and Dumeril, on M. Percheron's work entitled Bibliographie Entomologique.

Those who particularly devote themselves to the study of one branch of natural history, have a great interest in becoming acquainted with the works already published on the special object of research or observation with which they are occupied. Accordingly the greater part of authors make it a rule to indicate in general works the sources whence they have derived their information, and are careful at the same time to arrange their citations in chronological order.

M. Percheron, who has long been assiduously engaged in the study of insects, on some genera of which he has already published some very good monographs, such as those on *Cetonia* and *Passalus*, has strongly felt the necessity of arranging the works from which he obtained useful intelligence, in a series according to their dates. He had accordingly drawn up at first for his own use, a catalogue of all the entomological books whose titles he had become acquainted with, and undertook laborious researches to ascertain as many as possible: this he conceived it would be of advantage to the science, and to those who cultivate it, to publish for general use. He has made it his object to inscribe all the writings relating to insects, considered under the different relations of form, structure, classification, manner, habits, utility, injuries, &c. in a word, all the works on entomology.

Such is the work which M. Percheron is about to publish, and of which all the sheets hitherto printed have been examined by the above-named commissioners. It is a simple catalogue, in alphabetical order, of the names of authors, with the indication of the complete

title of their works, the date of their publication, and, where that was practicable, a notice of the period and the place of the birth and death of these naturalists. Unfortunately these simple indications contain no abridged notice of the contents of these works, and are unaccompanied with critical observations, yet such additions are of great interest on account of the judgments which they embrace.

After this first part of the work, which forms nearly three-fourths or a volume and a half, the author has drawn up a table of the articles in the order of the subjects and chronology; this is divided into chapters. The first comprehends the names of the authors who have written on insects, but under certain points of view only, such as the damages they may occasion, which our author names their *nocibility*; then in relation to their utility in agriculture, in the arts, in medicine, or in the general economy of nature, regarded in a philosophical manner. The second chapter indicates the books which treat of insects in regard to their general natural history, zoological or entomological. It is here that we find inserted travellers, museographers, micrographers. The third and last chapter makes us acquainted with the works which have treated of insects exclusively, such as memoirs relating to the formation and preservation of entomological museums; the generalities of their modes of life and metamorphoses; special works on the anatomy, physiology, and classification of insects; such as contain only observations on their different countries; and finally, all the works which have treated of the orders in particular, whether relating to all the genera, or those of some particular country, or such productions as have appeared under the title of monographs. Such is the order in which the name of every author is here inserted and repeated according to the date of publication.

We cannot disguise the fact, that the execution of this *Bibliographie* still leaves something to be desired, for we have remarked in it several important omissions, and we find books and memoirs inserted which have no relation to insects. However, the work may be of great benefit to entomologists: it will no doubt greatly facilitate their researches, and really promote the ulterior progress of the study of that branch of natural history.*

* *Comptes rendus Hebdomadaires des Séances de l'Academie des Sciences*, 6th February 1837.

Transactions and Periodicals—*British.*

Transactions of the Philosophical and Literary Society of Leeds, consisting of papers read before the Society. Vol. I. Part I. 8vo. Longman & Co. London. 1837.

Before noticing this volume, it may be satisfactory to our readers to be informed of the progress of the Society whose Transactions it proposes to detail. The following sketch was forwarded to us for insertion in our last Number, but circumstances prevented us then availing ourselves of the kindness of its author.

"In Leeds, above forty years ago, a Philosophical Society was established, which consisted of only a small number of members, and of whose proceedings no records remain. Amongst the number, two names have come down to us, Dr Priestley and William Hey, Esq. F. R. S. The society, however, did not meet with that support which its founders had expected, and, like many similar ones, gradually fell off, and became extinct. It is perhaps not too much to conjecture, that, although we have no certain or regular minutes of their meetings, yet at some of these, the splendid discoveries of Dr Priestley might have had their origin, and that, in consequence of some discussion, he might have been stimulated to make experiments, which, but for such discussion, would never have been made. When the Doctor left Leeds, he was succeeded at the Mill Hill Chapel by the Rev. William Wood, F. L. S., &c., whose name as a botanist and general naturalist is well known. He was author of *Zoographia*, and for some time conducted the natural history department in the Annual Review, as well as many of the articles on botany in Rees's Cyclopædia. Mr Wood died in 1809, from which period, for many years, there does not appear to have been any attempt, either individually or jointly, to promote scientific pursuits,—at least, if such were the case, it is now forgotten. In the autumn of 1818, however, a reaction began to be manifest, and a letter appeared in the Leeds Mercury, signed *Leodiensis*, suggesting the formation of a Philosophical Society. The proposal was received with approbation by a number of intelligent and public-spirited individuals, and a meeting was held at the Court-House, December 11, 1818, to concert measures, with a view to the accomplishment of so desirable an object. The venerable William Hey, Esq., whose memory will ever be associated with the history of the intellectual, religious, and local interests of Leeds, presided on the occasion, when, after a protracted discussion in reference to the object and scope of the projected institution, it was resolved that a so-

ciety should be founded on the most comprehensive principles, and should include all branches of science and literature, excluding all topics connected with politics, religion, and ethics. For a short time the meetings were held in the Court-House, after which a subscription was opened for the erection of a suitable building, which, in a few months, amounted to a sum so considerable as to justify the purchase of land, and the commencement of other active operations. The first stone was laid by Benjamin Gott, Esq. the 9th of July 1819, at the south-east corner of the present handsome edifice, and underneath it were deposited several coins of the reign of George III. The progress of the building was slower than had been anticipated, in consequence of unavoidable circumstances. It was soon discovered that the sum originally specified as adequate to its completion was insufficient for that purpose, and the work was consequently at a stand. The munificent spirit of Benjamin Gott and John Marshall, Esqs., which reflects equal honour upon those respected individuals and the town to which they belong, interposed with a noble alacrity to extricate the rising institution from the alarming dilemma in which it appeared to be placed. These gentlemen generously took each five additional L. 100 shares, and by that seasonable effort of liberality, relieved the society from the difficulties which threatened it. The first meeting of the first session was held on April 6, 1821, on which occasion the late C. T. Thackrah delivered an introductory essay. This has since been printed for the society. The building is of stone, with two fronts, and surrounded with pallisadoes, and consists of a lecture-room, laboratory, library-room, waiting-room, entrance hall, and resident curator's apartments on the first floor, above which are three apartments, one devoted to geology and mineralogy, in which are arranged about 4000 specimens of minerals and fossils,—the former arranged according to their chemical affinities after *Phillips*,—the latter according to the stratification after *Smith*. The nucleus of these collections were principally the gifts of one of its late curators, E. S. George, F. L. S.—The minerals were a few years since considerably augmented by an extensive purchase of the sale of Sir Alexander Crichton's minerals, by which very fine specimens were added of malachite, chromate of lead, Vauquelinite, Lapis lazuli, emerald, tourmaline, garnets, &c. One of the gems of the collection is an ærolite or meteoric stone weighing 1 lb. 7oz. which fell at Aigle, in the department of Orne, France. The geological department, although containing some very fine and unique specimens, is very far from what it should be, considering the vast facilities offered by the coal-pits and stone quarries so numerous in the immediate vicinity, abounding as they do with organic remains. With such advan-

tages at its disposal, the Leeds collection ought to possess one of the finest series of carboniferous remains in the kingdom. Such a series could only be formed by the united labour of several individuals interested in the science, who would visit the localities, of which, however, in most provincial institutions, there are unfortunately but few,—the majority contributing to the funds, but prevented by mercantile affairs or other pursuits from giving their time to the fagging department. Amongst the specimens are two unique heads of Megalicthys Hibberti, and a portion of its body; many fine Calamites, Asterophyllites, Lepidodendra, Sigillariæ, Lepidostrobi, Pecopteri and Equiseti, from the coal measures; a Sigilaria nine feet in height, from the sandstone near Wakefield; remains of Ichthysosauri from Whitby; fine mass of *Ophiura Milleri* from Scarbro'; bones of the Mammoth of the banks of the Ohio; splendid lily encrinite from the Dutchy of Brunswick; a tolerably good series of shells from the calcaire grossiere of the Paris basin, besides illustrations of the organic remains of the mountain limestone, Kelloway rock, coralline oolite, chalk crag, &c. The second room 43 feet by , and 20 in height, surrounded by a gallery, is devoted to zoology, the first nucleus for which was a collection of 135 species of British birds, by the liberality of its first and lamented curator, John Atkinson, F. L. S. Surgeon. To the ornithological department, considerable accessions have since been made, both foreign and British. Amongst the most attractive are, perhaps, a case of South American birds from Charles Waterton, Esq. the well known author of the *Wanderings*, a specimen of the rare *Trogon Pavoninus*, Trinidad goatsucker, king of the vultures, ostrich, Argus pheasant, and several of the Rhamphastidæ. The collection of Mammalia, like that in most provincial museums, is but small. It contains, however, a very fine skull of the Asiatic elephant, a wild boar, lion, tiger, leopard, jaguar, Polar and brown bear, wolf, kangaroo, seals, head of the walrus, porcupine, several simiæ, examples of the genera Galeopithecus, Dasypus, Ornithorynchus, Nasuta, Didelphis, Procyon, Bradypus, &c. The fish are nearly all in spirits, and principally from the Mediterranean. The greatest rarity is a specimen of the spiny shark, in a bad state of preservation, caught near Scarbro', and which is, I believe, the only British example in the kingdom. There is also a fine sturgeon, 9 feet in length, caught near Selby, and a specimen of Malthe vespertilio. The department of comparative anatomy is very limited, consisting of about thirty skeletons of animals, birds, and fishes, and a highly interesting series of forty-two wet and dry preparations, exhibiting the anatomy and physiology of the genus *Limax*. Among the invertebrate tribes, the

museum possesses some interesting examples of the different classes of the Zoophytes. The most prominent is a specimen of *Meandrina labyrinthica*, weighing 16 stone: of the *Pteropods*, there is *Cymbulia Peronii:* of *Gasteropods*, Glaucus Scyllæa, Doris, Aplysia: of *Echinodermata*, there are *Sipunculus*, *Holothuria*, several genera of the Echinides, *Asteria*, *Ophiura*, *Euryale verrucosa* and *Comatula:* of *Acalepha*, Actinea and Physalia, &c. The insects, which occupy nearly two glass-covered tables, include some rare and beautiful examples of the orders, and are arranged according to the system of Dr Leach, which was the most popular at the time, uniting the exotics and natives in the same case, the better to keep up the chain of affinity, and exhibit the gradual approximation of one form to another. The Crustacea are arranged also according to the views of that lamented naturalist. The shells according to Lamarck, which three departments, although not numerous, are highly respectable ones. The third room contains antiquities, works of art, and the dresses, &c. of uncivilized nations. The object of principal interest in this room is a very fine mummy of a priest, who lived during the reign of Ramesses V. upwards of 3000 years since, in a remarkably high state of preservation, enclosed in a coffin of elaborate workmanship. The head is bare, probably in conformity with the rites of priesthood. The pupils are distinctly visible in the orbits, and during an examination of the skull a few years since, the dura mater with its falx, was found to be quite perfect, the brain having been extracted through the nostrils, by breaking down the ethmoid bone. The muscles are by no means dry, but, on the contrary, allowed of being dissected, and the sciatic nerve traced. An account of this mummy was published by the Society five or six years since. There are also some curious remains of Terra cotta, from Cuzco, the ancient capital of Peru, together with some human skulls from the same spot. These have a singular appearance, from being artificially flattened on the right side and top towards the back part. The library has never created that interest which such a feature of the institution must have been expected to do, and, consequently, is not extensive, containing only about 600 volumes on the various branches of science, with the transactions of public bodies and journals of the day. Here is also deposited the chemical, electrical, and galvanic apparatus. The Society consists of about 67 proprietors, 125 ordinary members, and 100 subscribers; the first, having paid L. 100 towards the erection of the building, are shareholders, with the power of transferring or bequeathing the share, and exempt from all annual subscriptions and fines; the ordinary members, those who hold a three guinea share, with an annual sub-

scription of two guineas; and the last, subscribers annually of one guinea, having no interest in the property of the Society, or voice in its deliberations. Meetings are held the first and third Fridays in every month, from November to May, inclusive, for the reading of papers and essays by the members, to which each has the power of admitting a stranger. In addition there are annually two or three courses of lectures, by some public lecturer of eminence, amongst whom there have been Dr Dalton, Professor Grant, Professor Phillips, James Montgomery, Esq. Edward Taylor, Esq. &c. From the commencement of the Society 240 papers have been read on various branches of literature and science.

The private collections in Leeds are, first, a valuable museum of Natural History, &c. in Commercial Street, the property of Mr John Calvert, admission 1s.;—very extensive collections of shells, corals, and minerals, belonging to Miss Banks and Miss Rhodes;—the collection of comparative and human anatomy, belonging to the Leeds School of Medicine, and a collection of comparative anatomy and Natural History, especially of the Invertebrata, belonging to Mr Teale." H. D.

The well "got-up" volume before us is the first part of a proposed series of Transactions, and it gives us pleasure to know that the circumstances of the Society are now so prosperous as to enable it to publish a portion of the valuable papers which have and may hereafter come before it. From the abstract of the papers read since 1819, given in a short introduction to the volume, we perceive that the leaning of the great proportion of its members is more towards literary pursuits than the study of zoology and botany. Nevertheless, there is a fair proportion of papers devoted to interesting subjects in both these branches. We have now printed "on the Bed of the Mississippi, by the late JOHN LUCCOCK, Esq., read in November 1824, prepared from a personal knowledge of the course of the river obtained in a lengthened journey made in the previous year." An interesting paper in favour of the theory of the gradual corrosion or wearing of the barriers which stem the great common lakes, with the author's opinion of the former probable extent of water on the surface of the now existing North American continent.——On the varieties of water, by WILLIAM WEST, read November 1829.——A description of the internal structure of various Limaces, found in the neighbourhood of Leeds, by THOMAS NUNNELEY, read November 1834: illustrated by seven plates lightly but distinctly executed.——Abstract of a notice of certain Roman Coin Moulds, by JOHN HEY.——On the Anatomy of *Actinea cori-*

acea, by Thomas Pridgin Teale.——On *Alcyonella stagnorum* by the same author—both good papers. Of the latter we have already had occasion to speak in a former Number of this Journal. Four plates are devoted to the illustrations of these papers.——On the Yorkshire Coal-field, by Mr Edward S. George, F. L. S., read November 1836.

Loudon's Magazine of Natural History. New Series. May and June 1837.

I. *Zoology.*

Shuckard on Generic Nomenclature, p. 248.——Westwood's Observations in Reply to Mr Shuckard, p. 316.——Blyth on the Reconciliation of certain apparent Discrepancies observable in the Mode in which the seasonable and progressive Changes of Colour are effected in the Fur of Mammalians and Feathers of Birds; with various Observations on Moulting, p. 259 and 300.——Dr Moore on the Climbing and Gallinaceous Birds of Devonshire, p. 227.——Moore on the Wading Birds of Devonshire, p. 319.——Charlesworth's Notice of the Teeth of Carcharias megalodon in the Red Crag of Suffolk, p. 225.——On the Structure of the Fossil Saurians, p. 284.——Westwood's Description of a new Genus of British parasitic Hymenopterous Insect, p. 257.——J. E. Gray on the enlargement of the Eggs of some marine Molluscans during the period of their hatching, p. 247.

II. *Botany.*

Bird on the Existence of electric Currents in Vegetable Structures, p. 240, and p. 293.——Brown on the Preservation of Botanical Specimens from the attacks of Insects, p. 311.

Companion to Botanical Magazine. By Sir W. J. Hooker, Professor of Botany in the University of Glasgow.

The continuation of this work from our last notice, p. 87, contains, first, A sequel to the illustrations of Indian Botany by Wright and Arnot, with a plate of *Acalypha Alnifolia*.——New Ceylonese Melastomaceæ, by G. A. W. Arnot. The species described were collected by Colonel Walker, and transmitted to Drs Hooker and Graham. Seven species of *Sonerila*, and the same number of the Genus *Osbeckia*.——Characters of new species of Indian Acanthaceæ, by Professor Ch. Gottfr. Nees Von Esenbeck.——Synopsis of the East Indian species of Drosera and Parnassia, by G. A. Walker Arnot.——Notes on a collection of plants made in the Province of Asturias, in the year

1835 by M. Durien, by N. I. WINCH, Esq. &c. This is continued into the following number, with remarks on the distribution of each species to Britain and Ireland. 412 species are noticed in whole, of which 162 belong to the Cryptogamia.——Floræ insularum novæ Zelandiæ precursor; or a specimen of the Botany of the Islands of New Zealand, by ALLAN CUNNINGHAM, Esq., continued from a former number, contains the Fucoideæ, Lichenes, and Musci Calyptrati.——Remarks on M. Spach's memoir on the Cistaceæ, a letter from Dr Lindley in defence of some allegations made upon that gentleman's accuracy in a former paper. —— Botanical information:—1. A favourable notice of the Musci Angusiani, or a collection of the dried mosses of Angus and Forfarshire, preparing by Mr W. GARDINER Jun. Dundee, a work to be comprised in 7 or 8 12mo fasciculi, at the price of 3s. 6d. each.——2. Dr J. F. Lippold. We formerly mentioned the intention of this gentleman to proceed to Madeira with the view chiefly of collecting plants, but also to prepare other objects of natural history. A letter has been received from the Doctor intimating his safe arrival at the island, his friendly reception by Mr Lowe, and his delight in witnessing the luxuriance of vegetation. Collections of plants are expected during June. It is not proposed that Dr Lippold should remain longer than the present summer at his present station, and his new expedition has not yet been fixed on; but we shall doubtless have due intimation of the time and the terms of subscription, through the worthy periodical we are now reviewing.——3. Notice of the "Herbarium of the late John D. Prescott, Esq. of St Petersburgh, an eminent merchant of that place, and who has lately died suddenly. His leisure hours were devoted to the study of plants and enriching his harbarium, which latter is perhaps exceeded by few in Europe, especially that portion of it relating to the Russian Empire." It is warranted to contain 25,000 species, and is now offered for sale at the price of L. 1000.——4. The announcement of the first arrival of dried Brazilian plants from Dr Gardner, who visited South America to collect species for subscribers, accompanied by a long letter, which cannot fail to be most interesting to them, and to botanists in general. He was about to start for the Organ Mountains at the date of his dispatches, and an account of the expedition and his degree of success may be shortly expected.

TRANSACTIONS AND PERIODICALS.—*Foreign.*

Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN et MILNE-EDWARDS. *Botanique,* MM. AD. BRONGNIART et GUILLEMIN. Crochard & Co. Paris, Octobre, Novembre, et Decembre 1836.

I.—*Zoology.*

The October Number begins with a continuation of DUGES' interesting and elaborate *Observations sur les Aranéides,* which are now apparently brought to a close. The other papers are,—*Note sur des animaux qui colorant en rouge les marais salans, par* M. PAYEN.——*Examen des Crustaces rapportés de la saline de Marignane, par* M AUDOUIN.——*Observations préliminaires sur l'existence d'Infusoires fossiles et sur leur profusion dans la nature, par* M. EHRENBERG.——*Du Foie des animaux sans vertèbres en général, et particulièrement sur celui de plusieurs Crustaces, par* M. DUVERNOY.——*Analyse des trauvaux présentés à l'Acad. des Sc. pendant le mois d'Oct.* 1836: viz. *Notes sur quelques ossemens fossiles de l'Alsace et du Jura, par* DUVERNOY.——*Expériences sur l'électricité de la Torpille, par* M. MATTEUCCI.——*Expériences sur la Torpille, par* M. COLLADON.

The contents of the Number for November are—*Observations Zoologiques sur les Pagures et description d'un nouveau genre de la tribu des Paguriens, par* M. MILNE-EDWARDS.——*Quelques observations d'Helminthologie, par* M. CHARLES LEBLOND.——*Enumeration de quelques espèces de Reptiles provenant de la Barbarie, par* M. P. GERVAIS.——*Remarques sur l'évaluation de la Temperature de la surface du Globe pendant la période tertiaire, d'apres la nature des debris organiques qui s'y rapportent, par* M. E. DE BEAUMONT.——*Analyse des travaux* &c. viz. MM. BLAINVILLE et DURAND *sur un chameau fossile.*——*Lettres de* M. DUJARDIN *sur les Polypiers fossiles de la Craie.*

The Number for December is enriched with MILNE-EDWARDS' *Observations sur les Polypiers fossiles du genre Eschare;* and a notice, by the same eminent person, *sur un nouveau genre de Polypiers fossiles de la famille des Eschariens nommé Mélicérite.* These papers are illustrated by a series of excellent figures.——*Caractères du genre Plagiodonte et description du* Plagiodontia Ædium, *par* M. F. CUVIER. One of the Glires, little less than a hare, and nearly allied to Capromys, from which it is generically distinguished by some peculiarities in the structure of its teeth, which Cuvier fully details. The animals are called in Saint-Domingo 'Rat-Cayes,'

which signifies house-rats, whence the specific name: they do indeed approach inhabited places, but only during the night, for they shun the light of day. The male and female rarely separate. Their principal food consists of roots and fruit, and, like all the frugivorous Glires, they are very good for the table; and the Haitians, who are fond of dainties, search after them so carefully that the house-rat has now become very rare.——*Notice sur quelques Parasites et produits organiques du Lombric terrestre pour servir à sa physiologie, par* M. Suriray.——*Additions au Mémoire de* M. Duges *sur les Araneides.*——*Analyse des travaux, &c. pendant le mois de Decembre:* viz. Rapport de M. Dumeril sur plusieurs mémoires concernant diverses espèces d'insectes par M. Robineau Desvoidy.——Rapport sur un mémoire de M. Deshayes intitulé, Observations générales sur le genre Belemnite, par M. De Blainville.——Des Rapports de la teratologie avec les sciences anatomiques et zoologiques, par M. Isid. Geoffroi St Hilaire.——Recherches sur les rapports qui existent entre les propriétés nutritives de diverses substances végétales et la proportion d'azote qui entre dans leur composition, par M. Boussingault.——Rapport sur un mémoire de M. Robineau Desvoidy, ayant pour titre, 'Sur des chenilles qui ont vécu dans les intestins de l'homme, qui y ont subi leur mue et qui en ont été expulsées vivantes par l'estomac, par M. Dumeril.'

II.—*Botany.*

Octobre.—*Observations sur la propagation des Algues, par* J. Agardh,—the son of the celebrated Swedish algologist, whose fame he promises to extend and increase. The following are the inferences which Agardh deduces from the observations detailed in this excellent essay:—1°. The division of the Algæ into the articulated and inarticulated, hitherto adopted in all classifications, is inapplicable in the present state of our knowledge of them, and destroys the most marked affinities.—2°. If it is wished to distribute the Algæ into two more natural groups, the following may be substituted:

a. Zoospermeæ (*Nostochineæ, Oscillatorineæ, Confervæ, Conjugatæ, Ectocarpeæ, Ulvaceæ, et Siphoneæ.*) Materia granulosa interna uniuscujusque loculi (cellulæ, articuli vel tubi) frondem consituentis, tandem in fructificationem abeunte; sporidiis maturitate motu præditis, et singulis loculis per porum unicum egredientibus, demum per extentionem evolutis.—Viridescentes, incolæ præcipue aquæ dulcis, marisque minus salsi (in scrobiculis sinubusque, rarissime in aperto vel profundiori mari.)

b. Fucoide.e (*Ceramieæ, Floridieæ*, auct. *Sphacellarieæ, et Fucoideæ*, Ag.) Fructificatione vel receptaculis propriis inclusa vel soris plus minus extensis frondi immersis collecta. Sporis locomotivitate destitutis, ger-

minatione per membranam exteriorem novos utriculos emittentibus.—Roseæ et olivaceæ, omnes thalassiophytæ, illæ maris aperti et profundioris potissimum incolæ, hæ sinubus tranquillioribus (apud nos, an semper?) plerumque privæ.

3°. The movement of the sporules is not limited to the fresh-water Algæ, nor is it common to all Cryptophytes. It does not depend on any external circumstances, but on the contrary, is intimately connected with the vital phenomena of all the beings in which it is observed. It is not the expression of an animal life, although it has the appearance of this; and we ought not to compare it with the movements observed in the Diatomaceæ.—4°. Both kind of organs of fructification of the Florideæ are capable of propagating the species, and the one is never the rudiment or the young state of the other.—5°. The Algæ never grow from the reunion of several seeds, but each seed (seminule) produces its own individual.—6°. The theory of metamorphosis of modern algologists is based on facts which ought to be explained otherwise than they have yet been. The transformations of one species into another are illusory.——Duriæi *iter asturicum botanicum, anno* 1835 *susceptum, auctore* J. Gay. ——*Synopsis des Gerandiées, tribu des Scrophularinées, par* M. G. Bentham, from the "Companion to the Botanical Magazine." ——*Notice sur quelques cryptogames nouvelles, par* J. Desmazieres.——*Observations sur les Diatomées, par* M. de Brebisson.—— *Note de* M. Turpin, *ajoutée aux observations de* M. de Brebisson. This observer has discovered that the shell of the true Diatomaceæ is composed of silex, in which he has been anticipated by Ehrenberg, but his experiments are nevertheless very valuable, as confirmative of a discovery which has given origin to some curious researches on the composition and formation of tripoli and similar deposits.—— *Description de* l'Euphrasia Jaubertiana, *nouvelle espece du sous-genre* Odontites, *par* A. Boreau.

Novembre.——*Organographie des Cistacées, par* Edouard Spach.—— *Quelques observations relatives aux genres Scilla et Urginea,—deux genres à établir dans la famille des Liliacées, et description d'une espèce nouvelle, par* Ad. Steinheil.——*Sur le* Lythrum alternifolium, *par* M. Boreau.——*Sur la faculté que possèdent les plantes d'absorber les infusions colorées par leurs racines, par* J. G. Towers.——*Sur la faculté d'absorption attribuée aux spongioles des racines par* M. Knight.——This and the preceding are translations from the Transactions of the Horticultural Society of London. ——*Note sur deux nouvelles espèces du genre* Spitzelia, *par* M. C. H. Schultz.——*Enumeration des plantes decouvertes par les voya-*

geurs, dans les Iles de la Société, principalement dans celle de Taïti, par J. B. A. Guillemin.

Decembre.—*Notice sur les Plantes cryptogames récemment découvertes en France, contenant aussi l'indication précise des localités de quelques espèces les plus rares de la Flore Française, par* C. Montagne.——Duriaei *iter Austuricum Botanicum,* continued. ——Biasolettia et Kladnikia, *deux nouveaux genres de la famille des Ombelliferes, par le Prof.* Koch. A translation from the 'Flora.' ——*Conspectus Monographiæ Cistacearum,* auctore Eduardo Spach.——*Rapport fait à l'Académie des Sciences par* MM. de Mirbel, Dutrochet, et Aug. de Saint-Hilaire, *rapporteur, sur un Mémoire relatif à la structure et au développement des organes générateurs d'une espèce de Marsilea trouvée par* M. Esprit Fabre *dans les environs d'Agde.*

American Journal of Sciences and Arts. Conducted by Benjamin Silliman, M. D., LL. D. Vol. xxxii. No. 1. April 1837. Newhaven. London agent, O. Rich.

The April number of this long established and important American periodical has just reached us, commencing the present year. The following is a condensed abstract of its zoological and botanical papers.

I. *Zoology.*

On the Œconomical uses of some species of Testacea, p. 53.—— History of the *Mytilus Margaritiferus,* Linn., *Mya Margaritifera,* Linn., and *Pinna rotundata*? Linn. These historical accounts are compiled from various sources, to which references are given. We may remark, however, that the fishing, if such it may be called, of the second species, the "horse muscle," is much more general in the north of Scotland than the author supposes, and the shell much more plentiful, literally paving the bottoms of some of the streams. In many parts they are gathered into large heaps and either rotted, or the pearl immediately extracted. We here allude to what is provincially termed the "Horse Muscle" as mentioned by the author of the paper. We are not so sure that it is the M. Margaritifera of Linn. This paper will be continued.——Notice of the Shad and Shad fisheries of the river Delaware, by Samuel Howell, M. D. Not a scientific, but nevertheless an interesting paper. The shad (no scientific name for the fish is given) enters the Delaware for the purpose of spawning in prodigious numbers about the middle of March, and are fished in various ways, but chiefly by what are cal-

led "Gilling-Seines," from taking the fish in the meshes by the gills. The river continues at its height until the beginning of May, and the season terminates about the 20th June. The annual amount taken by those seines and drift nets is calculated at about one million five hundred thousand, worth, at the usual price, about one hundred thousand dollars. The principal market is Philadelphia.—We should like to see a scientific description of this fish with a little more detail given to his habits during the ascent of the river. We would recommend also the examination of the liquid contents of the stomach, which is said to contain nothing solid, with a high magnifying power.——Description of a new Trilobite, by JACOB GREEN, M. D., p. 167. Calymena phlyctænodes, Green, considered analogous to the C. variolaris of Dudley in England.

II. *Botany.*

Account of an excursion to mount Katahdin, in Maine, by Professor J. W. BAILEY, p. 20. The excursion seems to have been undertaken rather hurriedly, and the time at the disposal of the party was much too short. The country, however, was wild and interesting, and might furnish materials for a valuable paper, were the journey undertaken at leisure, and the members of the expedition active and enterprising, rigidly examining the mountain and its encircling cypress swamps.——Remarks on the natural order Cycadeæ, with a description of the ovula and seeds of Cycas revoluta, Wild. by A. J. DOWNING, p. 45. A lithographic figure accompanies the paper. The remarks chiefly refer to the impregnation of the female flowers, and the alliance of this family to the Coniferæ.

There are several mineralogical and meteorological papers in this Number.

INTELLIGENCE.

ZOOLOGICAL.

Irish Hare, (*Lepus Hibernicus*, Yarrell.)—Mr Yarrell was, I believe, the first zoologist who observed that a considerable difference existed in the external character of the Irish and common hares. His account will be found in the proceedings of the Zoological Society for July 23, 1833, since which time Mr Bell, in his History of British Quadrupeds, has described both of them, characterizing the Irish hare under the name of L. Hibernicus. I am not, however, aware that any observations on the anatomical distinctions of the two species have been made public. With a view, therefore, of filling up the blank to a certain degree, this paper is written.

On placing the skeletons of the two species in juxtaposition, the most obvious distinguishing characters are the greater size altogether of the skeleton, the greater length of the lateral processes of the lumbar vertebra, the superior breadth of the scapula, the greater breadth of the ribs, the greater length of the humerus in proportion to that of the ulna, (which is scarcely longer than in the common hare,) together with the much larger size of the cranium and inferior maxillary bones in the Irish hare. These differences would probably distinguish it as a species distinct from the common hare, did no other characters exist.

In the numbering of the vertebræ and ribs they do not differ, except as to the caudal ones, which in the Irish hare are 13, and in the English 16; the sacral in both are 4, the lumbar 7, the dorsal 12, and cervical 7, making the total number in the Irish hare 43, and in the common hare 46.

The ribs in each species are 12. The males of both species are smaller than the females in all their admeasurements. The intestinal canal is in the male of the Irish hare nearly two feet shorter than in the female. The following table will shew the relative measurements in the female of each species, of some of the principal bones, and of the intestinal canal.

	L. timidus, *F.*	*L. Hibernicus*, *F.*
Length of the intestinal canal from stomach to anus, - -	14 ft. 1 in.	18 ft. 6 in.
Length from cæcum to anus, -	3 6	4 1
—— of cæcum, - -	2 0	1 7

Length of humerus,	$3\frac{3}{12}$ in.	$3\frac{8}{12}$ in.
——— ulna,	$3\frac{5}{12}$	$3\frac{6}{12}$
——— femur,	$4\frac{3}{12}$	$4\frac{5}{12}$
——— tibia,	$4\frac{8}{12}$	$4\frac{10}{12}$
——— cranium,	$3\frac{3}{12}$	$3\frac{7}{12}$
Breadth of cranium,	$1\frac{8}{12}$	$1\frac{9}{12}$
——— scapula,	$1\frac{5}{12}$	$1\frac{7}{12}$

T. C. Eyton.

Lutjanus rupestris.—A specimen of this interesting fish has been taken on the coast of North Wales.—T. C. Eyton.

Clausilia Rolphii.—Specimens of this interesting British shell have been forwarded to me by my friend, Mr C. Finch, who discovered it in the old habitat, Charlton Wood, Kent, last May.—Daniel Cooper.

Ehrenberg's Infusoria.—In making a recent communication to the Academy of Sciences respecting the *double* nature of the organs of generation in the infusoria, M. de Humboldt announced that the great work of this author, on that singular class of animals, is very nearly completed, and will be published in a short time. It will contain engravings of 492 of the polygastric infusoria, and 163 of the rotiferæ, from drawings made by M. Ehrenberg.

Proposed New Work on American Skulls.—A work, to be entitled "Crania Americana; or a comparative view of the skulls of various aboriginal nations of North and South America," is noticed in the last number of Silliman's Journal, as having been for some time contemplated by Dr Samuel Morton. The work is proposed to be of a folio size, and to contain from twenty-five to thirty lithographic plates, on which "at least fifty skulls will be represented, with such national, individual, and anatomical illustrations, as can be obtained in reference to each. The work will be preceded by an *introduction*, embracing a general view of the five *great races* of men, and followed by an exposition of the probable origin of the American tribes."

Fossil footsteps in Sandstone and Graywacke.—Professor Hitchcock has discovered in the valley of the Connecticut River, the imprints of what he considers fourteen new species. Some bear so near a resemblance to the feet of living saurians, that they have been denominated *Sauriodichnites*. The Professor says, "I have

no certain evidence as yet that any of these impressions were made by four-footed animals, although, in respect to two or three species, I have strong suspicions that such was the fact. I have sometimes thought they might have been made by pterodactyles; yet they have in general fewer toes than those described by Cuvier and Buckland. Within a few weeks past I have found on the flag-stones, in the city of New York, some marks, which I suspect were made by the feet of a didactylous quadruped, which, like the Marsupialia, moved by leaps. The rock is slaty graywacke, from the banks of the Hudson, between Albany and the Highlands." Drawings of these marks, with the tracts of living birds, have been prepared, and will be published so soon as the localities are again examined.—*Silliman's Journal, April* 1837.

BOTANICAL.

Blysmus Compressus.—I was not aware, until informed by my friend, the Rev. W. Wood, that this plant had been found in the neighbourhood of London, (not having seen any station for it.) It is, however, most plentiful in a bog at Beddington Park gate, near Carshalton, Surrey.—DANIEL COOPER.

BOTANICAL SOCIETY OF EDINBURGH, January 12th 1837.—Professor Graham in the Chair. The following members were elected:—*Resident,* Mr J. H. Branfoot, Mr R. Wilbraham Falconer, Mr George A. Martin, Mr J. W. Mudge, Mr John Percy, Mr Thomas R. H. Thomson, Mr Edward Wells. *Non-Resident,* The Right Hon. The Countess of Dalhousie, Dalhousie Castle; Dr Allman, Dublin; Mr H. Baber, Trin. Coll. Cambridge; Dr Frederick Farre, London; Professor Henslow, Cambridge; Mr G. Quekett., London; Mr C. A. Stevens, Trin. Coll. Cambridge.—

Specimens were stated by the Secretary to have been received since last meeting from Dr Alexander, Dr Macreight, Mr N. B. Ward, Mr Baber, Mr Stevens, Professor Henslow, Mr Babington, Mr Lloyd, Mr Mack, Mr Lindsay Carnegie, Dr Walker Arnott, Dr Van Rensselaer, Mr Veronge, Mr R. W. Falconer, Mr White, Mr Christy, Mr Munby, Dr Graham, Dr M'Nab, Mr J. M'Nab, Mr Brand, Mr Stables, Mr Martin, and Dr Pollexfen.—Donations to the library were announced from David Steuart, Esq. and C. C. Babington, Esq.

Mr Percy read an account of an excursion to the "Jardin de la Mer de Glace" at Chamouni, which was made in July last, with the view of exploring the botany of that elevated spot in the Alps

of Savoy. Mr Percy strongly recommended the Brezon, a mountain about fifteen miles from Geneva, to the attention of botanists who commence their excursions in Savoy, as it not only presents a great variety of alpine plants, but affords the greatest facilities for obtaining them. The "Jardin" was described as consisting of a few exposed and almost naked masses of rock, occupying only a small triangular area, which is bounded by the "Moraines" of the adjacent glaciers; and the appellation "garden" was stated to be merely applied by comparison with the desert around. An enumeration was given of 33 Phænogamous and 6 Cryptogamous species, which were collected at the Jardin, from an elevation of 9000 feet above the level of the sea.

Mr Campbell read a letter from Mr R. Ball, Dublin, to Sir W. J. Hooker, mentioning that *Erica vagans* had been discovered by Dr Burkett, on an islet on the coast of Waterford, near Tramore in Ireland.

Dr Barry exhibited specimens of the plants collected by him in his ascent of Mont Blanc, 16-18th September 1834. A list of the plants collected by Dr Barry, so far as named, was communicated by him; dividing them first, into those from below the snow line, which was stated to be in that Lat. 8000 feet above the sea; and, second, those from the Grand Mulet rock, about 9000 feet above the sea, or nearly 2000 feet above the line of perpetual snow.

The Curator, Mr J. M'Nab, exhibited specimens of *Cinclidium stygium*, a moss new to Britain, discovered by Mr John Nowel, of Halifax, on a moor near Maltham Tarn, in Yorkshire; communicated by Mr Leyland.

Mr M'Nab also read a communication, giving an account of some remarkable forms of Norway spruce, *(Abies communis,)* growing on the property of Whim, in the county of Peebles.

Feb. 9th.—Dr Balfour in the Chair. The following members were elected:—*Resident,* Mr A. Mack, Mr. Edward R. Roberts, Dr Alexander Van Rensselaer, Mr Julius Veronge, Mr Frank Isa White.—*Non-Resident,* Professor Royle, London.—*Foreign,* Colonel Brown, Thun, Switzerland; M. Guthnick, Berne, Switzerland; Professor Meisner, Basle, Switzerland.

In accordance with certain resolutions come to at an extraordinary meeting of the Society held on 4th inst., providing for the election of honorary members, and fixing the number of these at six British and twenty-five Foreign, the following noblemen and gentlemen were elected, viz.—*British,* His Grace the Duke of Bedford, His Grace the Duke of Devonshire, Robert Brown, Aylmer Bourke

Lambert, Nathaniel Wallich.—*Foreign*, Prof. Agardh, Lund; M. Bieberstein, St. Petersburgh; Prof. Brongniart, Paris; Prof. Fries, Lund; Prof. Hornemann, Copenhagen; Baron de Humboldt, Berlin; Prof. Koch, Erlangen; Prof. Ledebour, Dorpat; Prof. Link, Berlin; Dr Martius, Munich; Prof. De Candolle, Geneva; M. De Lessert, Paris; Dr Fischer, St Petersburgh; Prof. Mirbel, Paris; Prof. Nees Von Esenbeck, Breslau; M. Auguste St Hilaire, Paris; Prof. Tenore, Naples; Prof. Torrey, New York; Prof. Treviranus, Bonn.

Specimens were stated by the Secretary to have been received since last meeting, from the Rev. Mr Gordon, Dr Walker Arnott, Mr Shuttleworth, Professor Meisner, Mons. Guthnick, and Colonel Brown. Donations to the library were presented from R. J. Shuttleworth, Esq. and Professor Meisner.

Dr Balfour read a communication, addressed to the President of the Society, from the Rev. Gerard Smith of Chichester, accompanying specimens of *Lycopodium pallescens*, and explaining the property which it possesses, in common with several other species of the same genus, of expansion in water, and of recollapsing when dried, subsequent to immersion; a power which it retains for many years, if not too long exposed to moisture, in which case the spikelets rot, and fall off upon drying. Specimens were exhibited in different states; some which had been immersed and were fully expanded; others in the act of expansion; and others again, in the dried and collapsed state.

A remarkable variety of *Lamium purpureum*, from Dr Greville's herbarium, was exhibited, which, from its deeply incised leaves and general appearance, approached very near to *L. incisum*. A beautiful series of drawings prepared by Dr Greville for the *Algæ Britannicæ* were also laid before the society, and attracted much interest.

March 9th.—Professor Graham in the chair. The following members were elected: *Resident*, Mr Henry Mapleton, Mr William Walker. *Non-resident*, Mr George J. Lyon, Glasgow; Mr James Stuart Menteath, yr. of Closeburn; Dr G. A. F. Wilks, London.

Specimens were presented from Mr M. J. F. Sidney.

Dr Graham read a letter from the Countess of Dalhousie, intimating her intention of presenting to the society her East Indian Herbarium; and at the same time exhibited one of the fasciculi of this most valuable collection, as illustrative of the admirable manner in which the specimens had been prepared and preserved. The thanks of the society were unanimously and warmly expressed to Lady Dalhousie for her splendid donation; and the proposal, that her Ladyship should be elected an honorary member, having met with the most cordial approbation, it was carried by acclamation.

Mr Nicol read a paper on the microscopic structure of the wood of various species of *Rhamnus*, showing that in various instances marked peculiarities of internal structure bore reference to obvious external characters. The species examined were the *Rhamnus catharticus, hybridus, infectorius, oleoides, alpinus, Alaternus, latifolius* and *Frangula;* the first six of which have the vessels, as seen in transverse sections, arranged in a similar and very peculiar manner. The two last, *R. latifolius* and *Frangula,* present a structure so strikingly different from that of the other species, as to have suggested to Mr Nicol the possibility of a difference in the botanical characters, the farther investigation of which he said it was not for him, but for the botanist to undertake.

The first part of a paper by Mr Shuttleworth was read, containing an account of a Botanical excursion to the Alps of the Valais in Switzerland. In this paper Mr Shuttleworth gave an interesting account of an unsuccessful attempt to cross the Glacier of Taesch, where he was compelled to remain upon the ice during the night, and had the danger of his return greatly increased by a fall of snow. The remainder of the paper, giving an enumeration of the species collected, with observations upon them, was postponed till next meeting.

April 13th.—Dr Balfour in the chair. Mr Henry Melville and Mr William Richardson were elected Resident Members.

The remainder of the Countess of Dalhousie's East Indian Herbarium was presented, accompanied by a letter from her Ladyship to the President, authorizing the arrangement and disposal of the specimens in whatever manner might be considered most useful, and most conducive to the advancement of botanical knowledge. Several donations to the library from Dr Walker Arnott were presented.—The thanks of the Society were directed to be given to Lady Dalhousie and Dr Walker Arnott for their respective donations.

An abstract of the second part of Mr Shuttleworth's paper was read by Dr Balfour. This portion of the paper contained an enumeration of 430 species of plants collected by Mr Shuttleworth in the Canton of the Valais, with occasional remarks; and of these Dr Balfour had selected for his present purpose such as seemed to him more immediately interesting to the British botanist. *

Mr Carpenter made some remarks on the different forms of the organs of respiration in different classes of plants, and at different periods of their growth. After pointing out the analogy in elementary structure between the leaves of vegetables and the pulmo-

* This paper will be found in the Mag. of Zool. and Bot.—No. vii. et seq.

nary or branchial apparatus in animals, he stated that the cotyledons in the higher plants appeared to perform all the functions of true leaves, and to be analogous to the temporary gills so remarkable in the Batrachian reptiles. In ferns, the frondose expansion, which is formed by additional cells produced from the original spore, and which decays when the gyrate frond is evolved, may be viewed as similar to the cotyledonary body in phænogamous plants. In other cryptogamous plants, as *Marchantia polymorpha*, this primary frond does not decay, but remains permanent, and may be looked upon as a persistent cotyledon. Mr C. then went on to show that the developement of the offspring, which takes place during the ripening of the seed in phænogamous plants, is analogous to that which in the cryptogamous follows the germination of the spore; thus fulfilling a law which appears to pervade organized nature, that the different organs of the higher beings in the progress of their evolution pass through a series of forms analogous to their permanent states in the lower.

Dr Balfour read a communication regarding several species of British ferns, in which he particularly alluded to the observations recently made by Mr Don in the Linnæan Transactions. Specimens of all the species and varieties of the ferns alluded to were exhibited by Dr Gilbert M'Nab,—including *Aspidium dumetorum, dilatatum, irriguum, &c. Cistopteris dentata*, both from England and Scotland, also *C. regia* and *alpina*.

Dr Balfour mentioned having found *Scabiosa columbaria* last autumn, in considerable abundance, on the sea shore near North Berwick.—W. H. Campbell, *Sec.*

MISCELLANEOUS.

Blumenbach.—"The great lion of this university (Goettingen) is Blumenbach, Professor of Natural History, by whom I was most graciously received, though without any formal introduction; yet I have heard he is not always so courteous. He speaks English fluently,—in fact, he is the only professor who appeared to have any knowledge of the language, which surprised me much, considering the intimate connection that exists between Hanover and our own country. The venerable Professor, though he has reached his eighty-second year, still retains all his faculties perfect. He spoke of the kindness of George III. during his visit to England, forty years since, at which period he also went to Oxford. One of his apartments is fitted up as a museum; it is by no means large, but contains rather an odd medley of preparations, and a numerous collection of skulls of negro tribes, as well as specimens explanatory of

comparative anatomy. He called my attention more particularly to a tattooed head of a New Zealand Chief, which was presented to him by the Duke of Northumberland, and on which he appeared to set a very high value.

" His lecture commences every day, except Saturday, at three ; his class did not exceed forty. He stoops considerably, usually wore a shaggy great coat, with a small green velvet cap on his head, his hair hanging in long silvery locks. He was particularly fond of laughing at his own jokes and anecdotes, which he mentioned during his lecture, sometimes raising his voice to a stentorian pitch, whilst at others it could scarcely be heard. He could read his notes without the assistance of spectacles, and often explained his subject in terms not quite adapted to ' ears polite ;' expressing his astonishment or admiration at the wonders of nature in no measured language—making use of a phrase, which, though of very unusual occurrence among us, still is very common among the Germans,—that of " Herr Jesus ;" which is, however, only an expletive, and occupies the place of *mon dieu* of the French. He exemplified his subject with preparations either dried or in spirits, as well as by plates or drawings ; some of which, from their age and roughness, were very curious.

" A specimen he valued much, and which he prized above all others, was the fœtus of a bear in spirits, which is very rarely seen ; and it was certainly a most misshapen object, of very diminutive size ; it was quite, as the old Professor expressed it, an ' unlicked cub.' Another rather interesting specimen was a young porcupine in spirit, before the quills had commenced growing ; in which he pointed out, on the outer side of the scapula, the two mammæ. An ostrich egg, arrived at the full period of incubation, was also curious, where the young bird had half-escaped from its shell : it was of large size, and its neck of very considerable length. He always appeared particularly delighted in mentioning any anecdotes connected with occurrences or incidents he had met with in England ; thus he used to speak of the size and value of the horses employed in the breweries of London, as well as those bred for the turf, or chase, in terms which no doubt excited the surprise, and perhaps, even the unbelief of many of his hearers.

" On the subject of the turtle, he gave some account of its excellencies with respect to the table, saying that when he was in England, he had seen whole courses served up in various forms and dishes, adding, at the same time, that the dessert consisted entirely of turtle, casting an apparently longing eye on the shell before him, as if he still remembered the bygone repast ! !

"On the subject of cocks, he gave an account of their fighting in England, exhibiting to his class a pair of steel spurs, as used by them in their battles. Of the flamingo* he had never seen a single specimen, though, at one of the museums at Oxford, he was shown a dried leg and foot.

"Blumenbach's lectures were by far the most interesting of any I attended at Göttingen. He exhibited one day a machine for hatching eggs, which he had frequently used, and which only required the heat of a spirit-lamp, and constant attention to keep all in order."—*Viator* in Medical Gazette, April 15, 1837.

British Museum.—A grant of L. 1575 has been voted by the House of Commons to enable the trustees of the British Museum to purchase the collection of shells belonging to W. J. Broderip, Esq. offered by him at the price of 1500 guineas, and valued by Messrs Turner and Sowerby, at L. 1640, 12s. 6d. Mr Gray says,—"The collection consists of nearly 3000 specimens, and contains about 200 species, or very distinct varieties, that are altogether wanting in the already extensive collection of the British Museum: Such is the beauty of the specimens, in consequence of the great attention paid by Mr Broderip to the purchase of none but the finest that could be procured, and so remarkable are the deviations in form and colouring in the several series of the more variable species, that nearly every individual specimen of the remaining portion will also be valuable to our collection, either in replacing a much inferior specimen, or as rendering more complete the series which we already possess. The duplicates to be displaced will be few, and will, for the reasons above given, be taken in every instance from our present collection, and not from among the specimens in the new acquisition. A very large proportion of the species contained in this collection, and wanting in the British Museum, are among the rarest shells that are known to exist, and many are absolutely unique."†

Wernerian Society Prize Essay.—It gives us much pleasure to announce that the honorary premium of Ten Sovereigns, or a piece of plate of that value, offered by the Wernerian Society of Edinburgh, for the best account of the fishes of the district of the Forth, has been awarded to Dr Richard Parnell, so well known to every

* The *Dodo* is evidently what Viator should have written.

† Lord Stanley stated in his place in the House of Commons on Friday last, That on Easter Monday, in the course of eight hours, 23,985, and on Whit-Monday, 30,000 persons had visited the British Museum without doing the slightest mischief.

one interested in British Ichthyology by the numerous additions he has made, within these two years past, to our native list.

OBITUARY.

PROFESSOR AFZELIUS.—"Professor Adam Afzelius, the Nestor of scientific men in Sweden, died at Upsal, on the 30th of last January, aged eighty-six years. He was the last pupil of Linnæus, and was celebrated for his travels in Asia and Africa. His African Herbarium, we believe, is now in the Banksian collection in the British Museum." *Athenæum, April* 22, 1837.—His name is commemorated in the genus Afzelia of Sir J. E. Smith. His papers on "Three species of *Trifolium*," and on the "genus *Pausus*," in the Linnæan Transactions, Vol. i. and iv., have been pronounced, by the Rev. Mr Kirby, to be "as nearly as possible a perfect example of a monograph;" and are worthy the careful study of every one who engages in a work of that class. Afzelius is among those "respectable names" mentioned by Dr Withering in his list of contributors to the third edition of the "Arrangement of British Plants;" he "looked over," says Withering, "great part of the Author's collection, and afforded many valuable observations concerning the identity of several Swedish and English species." At this time (1796) Afzelius was Demonstrator of Botany in the University of Upsal. He is the author of the following botanical works:

1. De Vegetabilibus Suecanis observationes et experimenta, resp. Wadsberg. 1 fasc. in-4. 1785.
2. Genera plantarum Guineensium, pars prima. 4to. 1804.
3. De Rosis Suecanis tentamen primum. 1804. 4to.—Tentamen secundum. 1805.

E. DONOVAN, Esq. F. L. S.—In the Gentleman's Magazine for July there is a record of this naturalist's death, with, we believe, a complete list of his writings. He died February 1, 1837, in John-Street, Kennington-road, and "has left a large family in destitute circumstances." The high price of his books has limited their sale, and it is probable that few of them covered the expense of their publication. The principal of them are devoted to the illustration of British Zoology in almost every class: perhaps the best and most interesting is his 'History of British Fishes,' in 5 vols. 8vo, which, however, is more valuable for its plates than the letter-press; and this indeed may be said of all his works, for they do not rank high in point of original observation or extensive literary research. Foreigners have occasionally ascribed to Donovan the discoveries of Montagu.

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